102

SERVICE MANUAL SD9000

marantz

model SD9000

Stereo Cassette Deck

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3. Complete description of parts.
4. Model number for which part is required (indicate MARANTZ).
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Australia

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92600 Asnieres
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West Germany

All of the above locations are fully equipped to take care of your total service needs. Because various countries have differing configuration requirements, it is necessary that you contact the service facility in your particular country. In the event that there is no service location listed for your country, please contact the nearest facility for the necessary assistance.

TABLE OF CONTENTS

INTRODUCTION 1

1. P.W. BOARD 1

2. TEST EQUIPMENT REQUIRED FOR SERVICING REPLACEMENT 1

3. CIRCUIT DESCRIPTION 2
   - 3.1 TAPE SPEED SELECTOR 2
   - 3.2 PLAYBACK EQUALIZER CIRCUIT 2
   - 3.3 RECORDING CURRENT SETTING CIRCUIT 2
   - 3.4 RECORDING COMPENSATING CIRCUIT 3
   - 3.5 BIAS OSCILLATOR CIRCUIT/ERASE OSCILLATOR CIRCUIT 3
   - 3.6 CONTROL CIRCUIT OPERATION 4

4. DISASSEMBLE 29

5. MECHANICAL ADJUSTMENT 31

6. ELECTRICAL ADJUSTMENT 33

7. DIAGRAM AND COMPONENT LOCATIONS 40
   - 7.1 Pre Amp. Assembly (PK11) Schematic Diagram and Component Locations 40
   - 7.2 Mic Line Volume Assembly (PK12) Schematic Diagram and Component Locations 40
   - 7.3 Output Volume Assembly (PK13) Schematic Diagram and Component Locations 40
   - 7.4 Computer Assembly (PK21) Schematic Diagram and Component Locations 43
   - 7.5 Program Selector Assembly (PK23) Schematic Diagram and Component Locations 45
   - 7.6 Power Supply and Bias OSC Assembly (P400) Schematic Diagram and Component Locations 46
   - 7.7 Digital and Meter LED Assembly (PK22) Schematic Diagram and Component Locations 46
   - 7.8 Timer Switch Assembly (PK24) Schematic Diagram and Component Locations 47
   - 7.9 Rec-Mute Switch Assembly (PK25) Schematic Diagram and Component Locations 47
   - 7.10 Program Select Assembly (PK27) Schematic Diagram and Component Locations 48
   - 7.11 Logic Control Assembly (PK31) Schematic Diagram and Component Locations 48
   - 7.12 Remote Jack Assembly (PK26) Schematic Diagram and Component Locations 48
   - 7.13 Safety Switch Assembly (PK32) Schematic Diagram and Component Locations 48
   - 7.14 Safety Switch Assembly (PK33) Schematic Diagram and Component Locations 48
   - 7.15 Timer Relay Assembly (P800) Schematic Diagram and Component Locations 49
   - 7.16 Per-Amp for Music Iterval DET 49
   - 7.17 Motor Governor Assembly (PM01) Schematic Diagram and Component Locations 49
   - 7.18 Photo Coupler Assembly (P001) Component Locations 49

8. BLOCK DIAGRAM 50

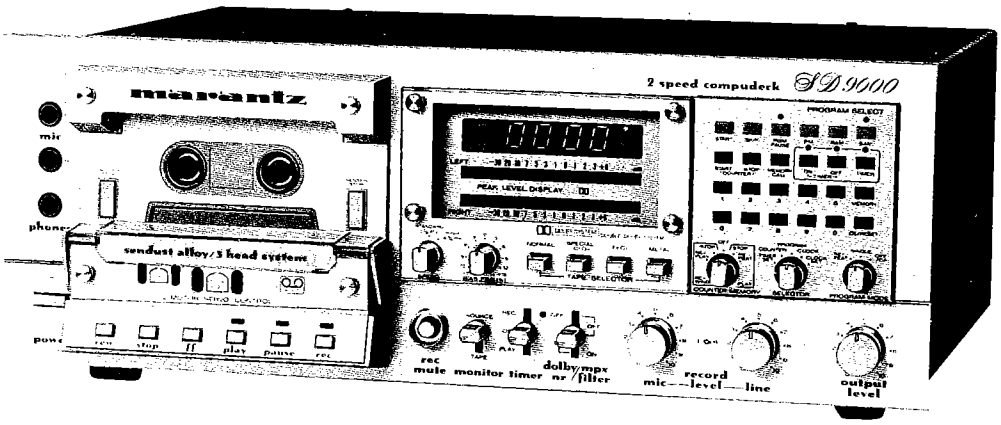
9. EXPLODED VIEW AND PARTS LIST 51

10. ELECTRICAL PARTS LIST 62

11. TECHNICAL SPECIFICATIONS 73

12. SCHEMATIC DIAGRAM 74

MARANTZ MODEL SD9000 STEREO CASSETTE DECK



INTRODUCTION

This service manual are prepared for use by Authorized Warranty Station and contains service information for Marantz Stereo Cassette Deck.

Servicing information and voltage data included in this manual are intended for use by the knowledgeable and experienced technician only. All instructions should be read carefully. No attempt should be made to proceed without a good undestanding of the operation of the Cassette Deck.

The parts list furnishes information by which replacement parts may be ordered from the Marantz Company. A simple description is included for parts which can be usually obtained through local suppliers.

1. P.W. BOARD

As can be seen from the circuit diagram, the chassis, of the Model SD9000 consists of following units. Each unit mounted on a printed circuit board is described with in the square enclosed by bold dotted line on the circuit diagram.

Pre-Amp	mounted on P.W. Board	PK11
Mic & Line Vol	mounted on P.W. Board	PK12
Output Vol	mounted on P.W. Board	PK13
Power Supply	mounted on P.W. Board	P400
Computer	mounted on P.W. Board	PK21
Remote Jack	mounted on P.W. Board	PK26
Digital & Meter LED . .	mounted on P.W. Board	PK22
Program Selector	mounted on P.W. Board	PK23
Program	mounted on P.W. Board	PK27
Timer Switch	mounted on P.W. Board	PK24
Rec Mute Switch	mounted on P.W. Board	PK25
Relay	mounted on P.W. Board	P800
Photo Cuppler	mounted on P.W. Board	P001
Mecha Logic Switch . .	mounted on P.W. Board	PK31
Sensor Stop Switch . . .	mounted on P.W. Board	PK32
		PK33
FF. Rew Gavernor . . .	mounted on P.W. Board	PM01
Pre-Amp for Music. . . .	mounted on P.W. Board	P900
Interval DET		

2. TEST EQUIPMENT REQUIRED FOR SERVICING REPLACEMENT

For measuring and checking the Model SD9000, the following instruments and materials are necessary.

- Audio Oscillator (AF OSC)
- Attenuator (600 ohm)
- VTVM
- Distortion Meter
- Oscilloscope
- Bandpass Filter
- Wow and Flutter Meter
- Torque Meter (Cassette Type)
- Digital Frequency Counter
- Blank Tape (Completely erased with bulk eraser)

*	AC-211	(Normal)
*	AC-511	(CrO_2)
*	CS-30	(Fe-Cr)
*	AC-701	(Metal)

NOTE: If any doubt is noted in a measured value, use a new tape.

- Test Tape (New Tape)

MTT-111	Wow and Flutter. Tape Speed.
MTT-212	Measurement of output level and
(MTT-112)	
MTT-150	Adjustment of output level.
MTT-216	Measurement of Frequency Response.
(MTT-116U)	(For Normal)
MTT-316	Measurement of Frequency Response.
(MTT-116K)	(For CrO_2, Fe-Cr)
MTT-121	Cross Talk.
MTT-141	Channel Separation.
MTT-112B . . .	Playback Signal-to-Noise Ratio. (W.T.D. only)

3. CIRCUIT DESCRIPTION

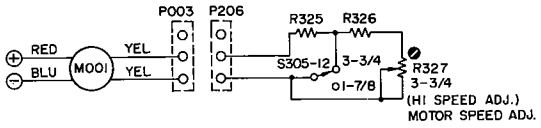
3.1 TAPE SPEED SELECTOR

Tape speed is changed by switching the motor speed to 1,800 rpm for 1-7/8 ips (4.75 cm/sec) or to 3,600 rpm for 3-3/4 ips (9.5 cm/sec).

1. R352 is used for precisely adjusting the motor speed to 3,600 rpm.
2. To precisely adjust the motor speed to 1,800 rpm, turn the variable resistor built-in the motor.

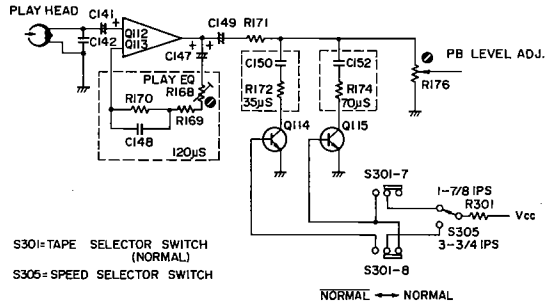
NOTE: The motor speed is known by playing back the test tape MTT-111 and measuring the reproduced frequency.

Motor speed (rpm)	Reproduced frequency (Hz)
1800	3000
3600	6000



3.2 PLAYBACK EQUALIZER CIRCUIT

The playback equalizer circuit is shown below.



Time contants of the playback equalizer circuit at each tape speed and selector position are as follows:

TAPE SELECTOR POSITION		NORMAL	SPECIAL/ CrO_2	FeCr	METAL
TAPE SPEED	1-7/8 IPS	120 μS	70 μS	70 μS	70 μS
	3-3/4 IPS	70 μS	35 μS	35 μS	35 μS

Circuit Function at Each Time Constant

(1) 120 μS

S305 is Tape Speed Switch for normal position. In the diagram, this switch is in the depressed position, causing Q114 and Q115 to turn OFF due to zero bias voltage. In this case, the playback time constant is set to 120 μS by C148 and R168 ~ R170.

(2) 70 μS

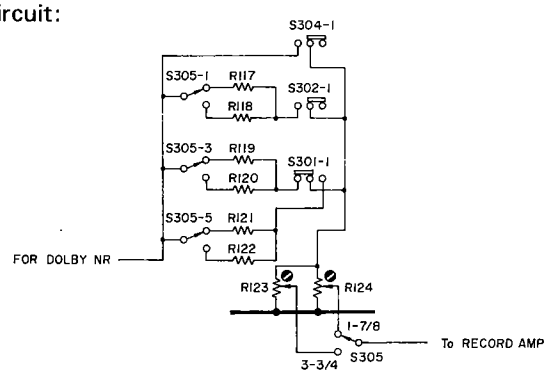
When the tape speed is 1-7/8 ips (4.75 cm/sec) and S301 is OFF (S115 turns OFF when the other tape selector switch is depressed), a bias voltage is applied to the base of Q115 which is then turned ON. When the tape speed is 3-3/4 ips and S301 is ON, Q115 is also ON. In either case, the playback time constant is set to 70 μS by C148, R168 ~ R170, C152 and R174.

(3) 35 μS

When the tape speed is 3-3/4 ips (9.5 cm/sec) and S301 is OFF, Q114 is ON and the playback time constant is set to 35 μS by C148, R168 ~ R170, C150 and R172.

3.3 RECORDING CURRENT SETTING CIRCUIT

Recording currents at each tape speed and each position of the tape selector switch are determined by the following circuit:



S301: Tape selector switch — Normal
S302: Tape selector switch — Special/CrO_2
S304: Tape selector switch — Metal
S305: Tape speed switch

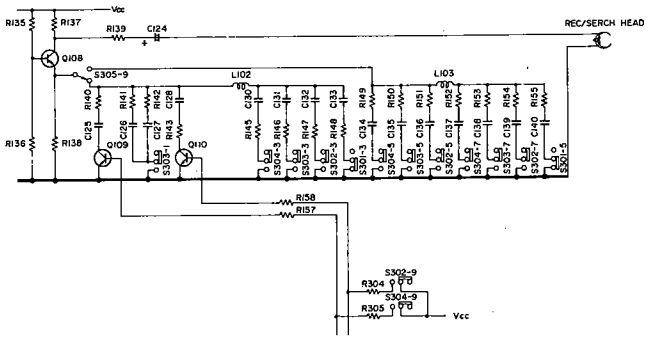
The switch (S303) for the FeCr position is not included in the above circuit. The recording current at this position is determined by R121 and R124 or R122 and R123. The resistors used to determine recording current at each tape speed and each tape selector switch position are shown in the table below.

TAPE SELECTOR POSITION		NORMAL	SPECIAL/ CrO_2	FeCr	METAL
TAPE SPEED	1-7/8 IPS	R121, R119 R124	R121, R117 R124	R121 R124	R124
	3-3/4 IPS	R122, R120 R123	R122, R118 R123	R122 R123	R123

3.4 RECORDING COMPENSATING CIRCUIT

(Tape Speed: 3-3/4 ips)

The method of recording compensation is the same as that used in our existing units where the amount of feedback in the recording amplifier (Q902) is varied.



S301: Tape selector switch — Normal
S302: Tape selector switch — Special/CrO_2
S303: Tape selector switch — FeCr
S304: Tape selector switch — Metal
S305: Tape speed switch

Tape Speed (IPS)	Tape Selector Position	Compensation
1-7/8	NORMAL	Peaking by L102, C133 and R148.
	SPECIAL/ CrO_2	Peaking by L102, C132 and R147 Mid range compensation by C128 and R143
	FeCr	Peaking by L102, C131 and R146 Mid range compensation by C126, C127, R141 and R142
	METAL	Peaking by L102, C130 and R145 Mid range compensation by C125 and R140
3-3/4	NORMAL	Peaking by L103, C140 and R155 only
	SPECIAL/ CrO_2	Peaking by L103, C139 and R154 Mid range compensation by C136 and R151
	FeCr	Peaking by L103, C138 and R153 Mid range compensation by C135 and R150
	METAL	Peaking by L103, C137 and R152 Mid range compensation by C134 and R149

3.5 BIAS OSCILLATOR CIRCUIT/ERASE OSCILLATOR CIRCUIT

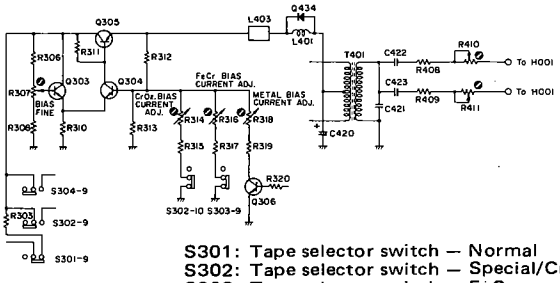
The SD9000 has a bias oscillator circuit and an erase oscillator circuit to provide optimum bias and erase current for the use of metal tapes.

- The bias oscilator circuit is driven by a regulated amplifier power supply.
- The erase oscillator circuit is driven by the motor power supply.

The bias current for any particular type of tape is selectable by the circuit shown below (selection of bias current is independent of tape speed).

1. Bias Oscillator Circuit

As shown bellow, by varying the Q304 base voltage, the bias oscillator circuit operational voltage is altered. In case of 4-3/4 i.p.s. (9.5 cm/sec), do not adjust by bias current. Adjust the recording EQ circuit, instead. Incidentally, R307 is the bias fine adjust control on the front panel.

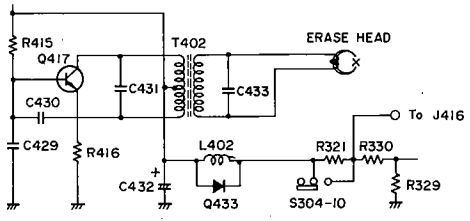


S301: Tape selector switch — Normal
S302: Tape selector switch — Special/CrO_2
S303: Tape selector switch — FeCr
S304: Tape selector switch — Metal

	Normal	CrO_2	FeCr	Metal
1-7/8 ips (4.75cm/s)	R411 R410	R314	R316	R318

2. Erase Oscillator Circuit

The erase oscillator circuit consists of Q417 and T402. Only in case of metal tapes, R321 is shorted to increase the erase current.



S304: Tape selector switch — Metal

NTROL CIRCUIT OPERATION

9000 tape deck is designed to have a wide variety tions such as time setting, timer setting, program- counter function and memory function; all these omplished by a single 1-chip, 4-bit microcom- iement μPD546C.

gh the microcomputer performs complex func- ne control circuit is extremely simple.

microcomputer, the memory and control func- re processed together at high speed through the nd timing of digital pulses available at input and terminals.

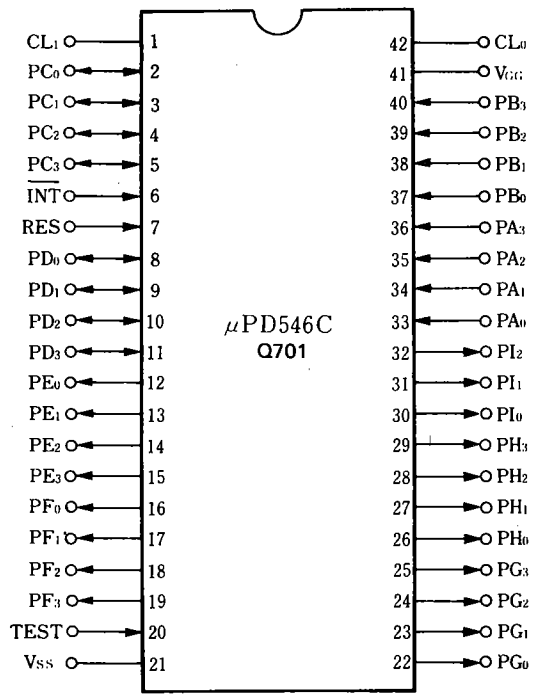
his instruction manual is limited in space, it is ble to explain in detail the methods of measuring ecking the relationship between the input/output and their timing. Thus, this manual is intended o cover the functions of operation buttons and keys.

9000 has various types of keys and switches to multiple operations, so special care should be when it is necessary to check the cause of trouble peration.

anual mainly deals with the functions of the 0 control circuit. Note that voltages and operat- ing given in this manual are for reference pur- nd are subject to change according to changes in supply voltage and production tolerance of nents.

2. Microcomputer

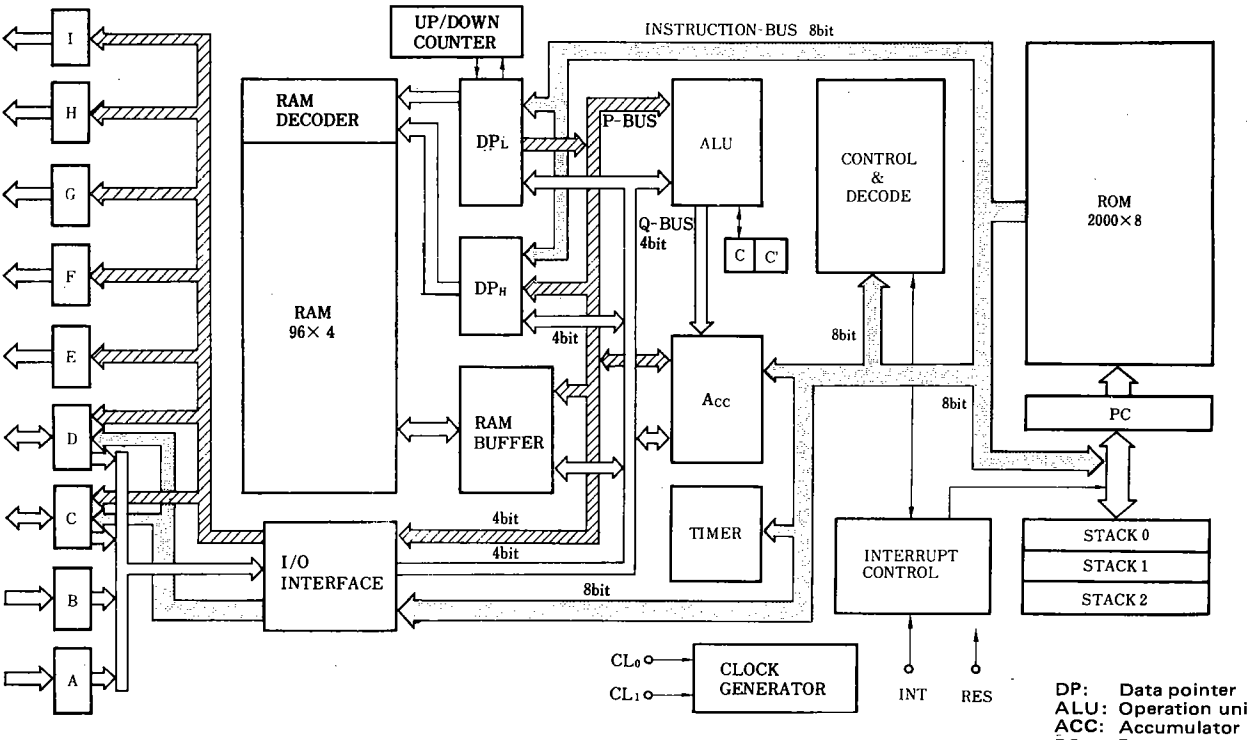
Terminal arrangement (front view)



CL0.1: Clock oscillator LC (external)
INT: Interrupt RES: Reset
PA3-0: Input port A3-0
PB3-0: Input port A3-0
PC3-0: Input/output port C3-0
PD3-0: Input/output port D3-0
PE3-0: Output port E3-0
PF3-0: Output port F3-0
PG3-0: Output port G3-0
PH3-0: Output port H3-0
PI2-0: Output port I2-0
TEST: Test

Fig. 2.1 Terminal arrangement (front view)

agram



DP: Data pointer
ALU: Operation unit
ACC: Accumulator
PC: Program counter
C: Carry F/F
C': Carry F/F

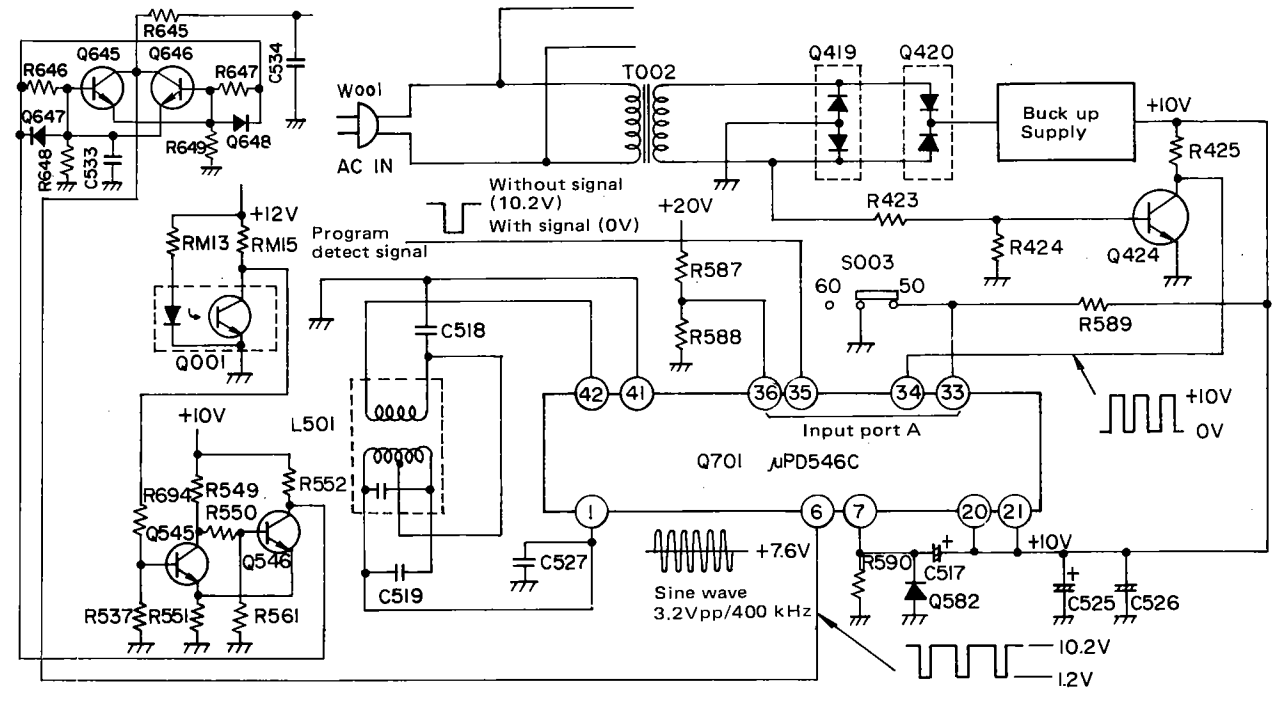
Block diagram

Table 2.1 Functions of input/output signals

No.	Signal	Function	Description	Remarks
1	CL1	Clock 1	Pin 1 on clock oscillator LC	
2 3 4 5	PC0 PC1 PC2 PC3	Input/output port C	E. F. G. H. } Keyboard strobe signal and 7-segment lamp signal	Not used as input terminal.
6	INT	Interrupt input	Counter pulse input (detects tape end)	
7	RES	Reset input	Initial reset input	
8 9 10 11	PD0 PD1 PD2 PD3	Input/output port D	A. B. } Operation button strobe signal C. D. } Keyboard strobe signal } 7-segment lamp signal Lamp signal, PM, ERROR lamp strobe signal	No used as input terminal.
12 13 14 15	PE0 PE1 PE2 PE3	Output port E	(4) SELECTOR control signal — ERROR lamp signal (3) PROGRAM MODE control signal (2) COUNTER MEMORY control signal (1) TIMER control signal — PM lamp signal } 7-segment lamp strobe signal	
16 17 18 19	PF0 PF1 PF2 PF3	Output port F	TIMER ON LED lamp signal TIMER OFF LED lamp signal REC LED lamp signal PRG PAUSE LED lamp signal	
20	TEST	Test input	Not used; connected to Vss	
21	Vss	Power supply	+10V ±1V	
22 23 24 25	PG0 PG1 PG2 PG3	Output port G	TIMER ON signal TIMER LED lamp signal RAM LED lamp signal SAM LED lamp signal	
26 27 28 29	PH0 PH1 PH2 PH3	Output port H	FAST FF REW C/R (CUE/REVIEW) } Tape deck operation mode control signal	
30 31 32	PI0 PI1 PI2	Output port I	PAUSE PLAY REC	
33 34 35 36	PA0 PA1 PA2 PA3	Input port A	Power frequency select signal Power sync signal Program detect signal Time display select signal	
37 38 39 40	PB0 PB1 PB2 PB3	Input port B	4. 3. 2. 1. } Program signal operation signal	
41	VGG	GND	0V	
42	CL0	Clock 0	Pin 0 on clock oscillator LC	

Control signal input circuit

Fig. 2.3 Control signal input circuit



ems (1) through (8) below are basic requirements erating the microcomputer.

n 1, 42

and pin 42 are the external terminals of the clock tor LC. The internal circuits of the microcom- must be synchronized with the clock signal for operation. Incorrect oscillation of clock signal sult in misoperation of the microcomputer.

ock signal at pin 1 should be a sine wave signal ut 3.2 Vpp/400 kHz (including a 7.6V DC com- t).

n 6

is the counter pulse input terminal. Pulses are ed by the up/down counter in the microcomputer. PLAY, FF or PAUSE mode, the pulses are ed up; in the REW or REVIEW mode they are ed down. When no counter pulses are preset at rminal and tape is being transported, the COUNT- MEMORY will not function.

pulse input duration is less than 2.0 seconds, the eck stops automatically.

n 7

s the reset signal input terminal. When a high level is applied to it, the internal circuits of the micro- uter are reset and all functions stop.

becomes high level just after the power is con- to the SD8000, regardless of whether the power is ON or OFF. Under normal circumstances, ltage at Pin 7 is 0V.

n 20, 21

) is a test terminal and Pin 21 is the power ter-

est terminal is connected to the power supply it is not used. The power voltage should be +10V

in 33

s an input terminal for the power frequency select The time signal of the SD8000 is obtained by ng the power frequency, so the frequency divider microcomputer needs to be given the proper fre- y division ratio according to the power frequency z or 60 Hz).

Pin 33 is 0V (GND), the frequency division ratio), and when it is 10V, then the ratio is 1/60.

in 34

s the input terminal for the time and timer signals. se signal of 10V with the power supply frequency d be applied to this terminal. Otherwise the cor- ime will not be indicated and the timer recording on will not operate correctly.

in 35

is the input terminal for the program detection . The programs to be played are controlled by the ed signals. When the deck is in the playback mode, gnal is 0V for recorded portions of tape, and 10V ank portions between programs (where no signal corded on the tape).

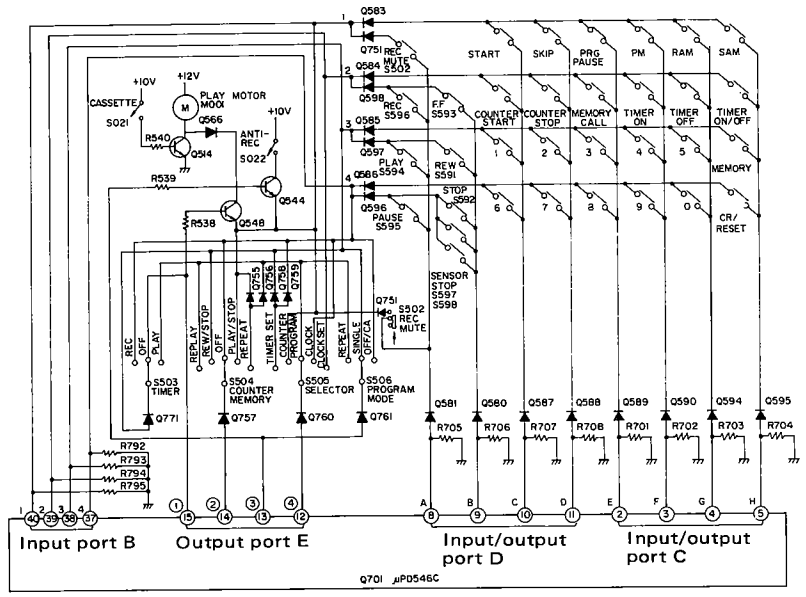
(8) Pin 36

Normally, a voltage of 10V is applied to this terminal. When the voltage becomes 0V, the display automatically indicates the time.

(9) Pin 31

This is the GND terminal.

Fig. 2.4 Operation/program signal input circuit

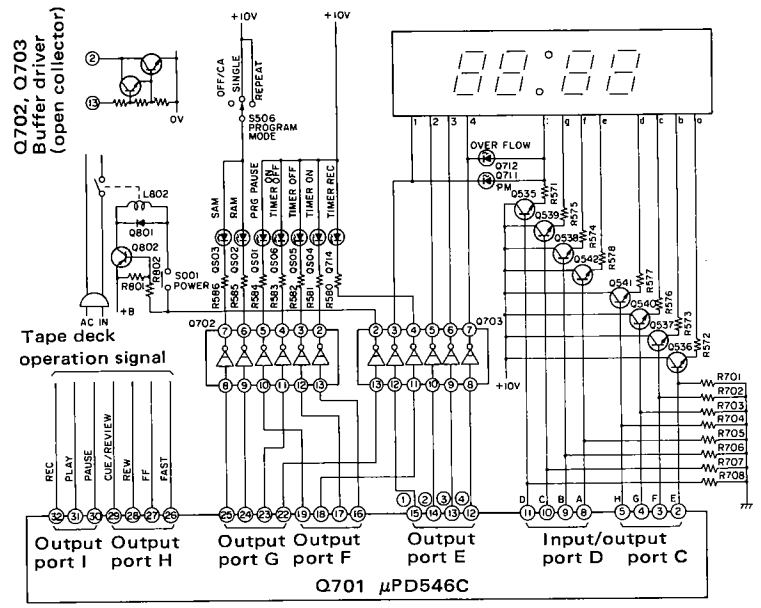


Besides the signals outlined previously, there are the input circuits for the operation signals (PLAY, FF, etc.) to select the mode of operation of the SD8000 and for the program setting signal (START, SKIP, etc.). Refer to Fig. 2.4.

In the microcomputer, these signals are synchronized with the clock signal and processed together to determine the mode of operation with the aid of the operation and program switches, input and output signals and their timing.

Operation/indication signal output circuit
Refer to Fig. 2.5

Fig. 2.5 Control/Indication signal output circuit



(1) Tape deck operation signal

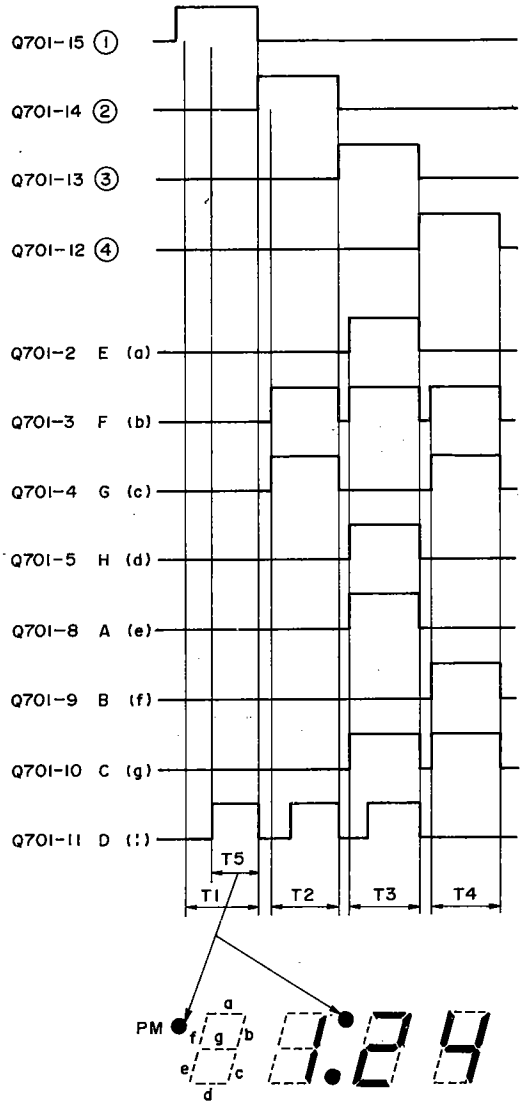
This signal is delivered from output ports H and I to determine the mode of operation of the tape deck. For example, in the PLAY mode, a high level signal is output by Pin 31 and the tape deck remains in the PLAY mode as long as the signal is high level. In the timer recording (or playback) mode, a high level signal is output from Pin 22 of output port G. For the functions of the circuits in each operating mode, refer to Section 4 "Tape Operation".

(2) Indication signal – 1

This signal is delivered from input/output ports C and D and output port E to drive the 7-segment LED, PM LED and OVER-FLOW LED in the display. For example, the following steps are taken for the display to indicate "1:24". Refer to Fig. 2.6.

a. Strobe signals (1) through (4) are output from output port E, lighting the 7-segment LEDs one by one starting from the top digit.
b. The 7-segment lamp signals are output from output ports C and D.
c. The lamps of all the digits will light in sequence, but they appear to light simultaneously because the driving cycle is very short.

Fig. 2-6 Principle of displaying "1:24"



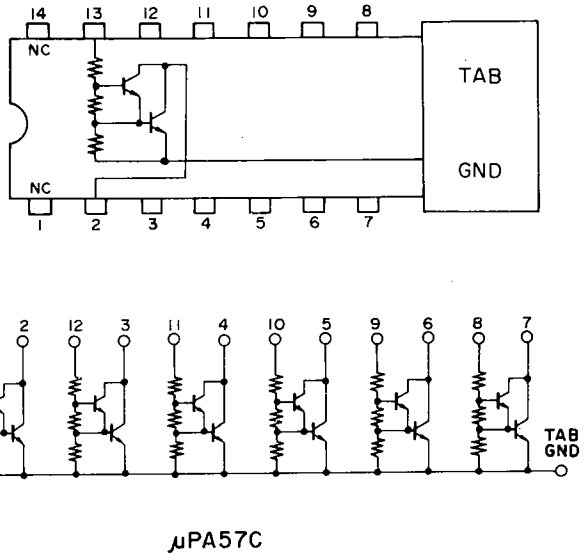
(3) Indication signal – 2

The LED lamp signals, used to indicate the mode of operation of the microcomputer, are output from output port F and output port G (excluding Pin 22).

The conditions required to light the LEDs are given in section 5 "Programming".

The Q702 and Q703 (μPA57C) are wired as shown in Fig. 2.7 to serve as a buffer driver.

Fig. 2-7 μPA57C



μPA57C

3. Circuit

This Section is intended to explain the functions of the motors, solenoids and related circuits.

3.1 Motor and solenoid

(1) Play motor (M001)

This FG servo DC motor is always rotating while a cassette is loaded and drives the capstan, i.e. the tape, at a constant speed. Winding torque is applied to the right reel disk during the PLAY or REC/PLAY mode.

(2) Reel motor (M002)

This FG servo DC motor is used to set the tape in FF, REW or CUE/REVIEW mode (CUE and REVIEW are performed in the fast forward and rewind modes respectively while programs are being played).

In each mode, the tape speed is maintained constant by means of the servo control system of the motor.

The reel motor rotates in the reverse direction when the deck is changed from the fast forward mode to the rewind mode. Either the left or right reel disk is driven according to the direction of the motor.

The reel motor is also used to remove slack in tape.

(3) Play solenoid (L001)

This solenoid functions when the deck is in the PLAY or REC/PLAY mode.

a. The head base is lifted and the head contacts the tape.
b. The pinch roller contacts the capstan and the tape starts running.
c. Slight braking is applied to the left reel disk to provide back tension to the tape.
d. The fast forward idler is set in the neutral position.

(4) Brake solenoid (L002)

This solenoid functions when the deck is in the PLAY, REC/PLAY, FF, REW, or CUE/REVIEW mode.

When it operates, the left and right reel disks are released to drive the tape.

(5) CUE/REV solenoid (L003)

This solenoid functions when the deck is in the CUE/REVIEW, PAUSE or REC/PAUSE mode.

In the CUE/REVIEW mode, the head base is lifted up to its middle position to permit the tape to contact the head. In the PAUSE or REC/PLAY mode, the capstan is released from the pinch roller and, at the same time, the play idler is disengaged from the reel to stop tape movement.

(6) Recording/Playback Mode Change Relay

This relay is energized when recording or playback, and recording-pause mode, and connects the recording head to the recording amplifier, activating the bias and erasure circuitry. When this relay is deactivated, the oscillator circuit is switched off and the recording head is connected to the between-program sensor for programming function.

3.2 Back-up Circuit

When the power switch is OFF, back-up power is supplied to the microcomputer via T002, rectifier (Q419, Q424) and voltage regulator circuit (Q421 ~ Q423). In this case, the voltage at Pin 36 of Q701 is 0V, thus time is indicated on the display.

During back-up operation, the programs stored in memory remain uncleared.

3.3 Solenoid drive voltage select circuit

The SD8000 is equipped with 4 solenoids. To ensure proper operation of these solenoids, a sufficient drive current is required.

If a large current flows into a solenoid, the solenoid is overheated which, in turn, increases the winding resistance and reduces the force of attraction of the solenoid. However, once the solenoid has been operated with a large current, it operates stable even with a relatively small current.

The SD8000 employs a solenoid drive voltage select circuit to select the operating voltage according to whether the solenoid is in the operating mode or holding mode.

Fig. 3.1 and Fig. 3.2 show the operating principles of the circuit in the PLAY mode.

Fig. 3-1 Solenoid drive voltage select circuit

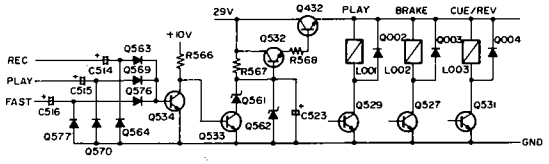
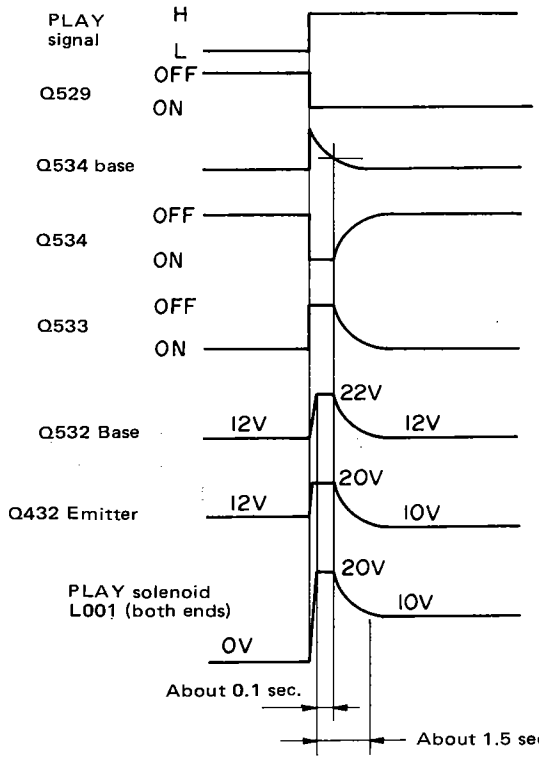


Fig. 3-2 Solenoid operation



a. The PLAY signal level in the output of the microcomputer rises to "H" (this signal turns on Q529 and Q527 through a circuit via a separate route). (Fig. 3-1)
b. The PLAY signal is differentiated, then passes through Q569 and turns ON Q534 momentarily. Q533 is OFF when Q534 is ON.
c. When Q533 is OFF, a bias voltage of about 22V is applied to the base of Q532 through Zener diode Q562. At this time, the output of the emitter of Q432 is about 20V.
Since Q529 and Q527 are ON, a voltage of 20V is applied to the PLAY solenoid L001 and the BRAKE solenoid L002 and hence they are driven by a large current.
d. When Q534 is OFF, Q533 is ON so the base of Q532 is biased by Q561. As a result, the bias voltage is reduced to about 12V, causing the voltage at the emitter of Q432 to be reduced to about 10V and thus the solenoid is held closed at about 10V during the PLAY mode.

3.4 Tape end detect circuit

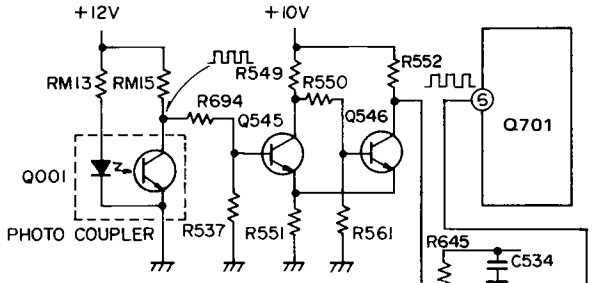


Fig. 3-3 Tape end detect circuit

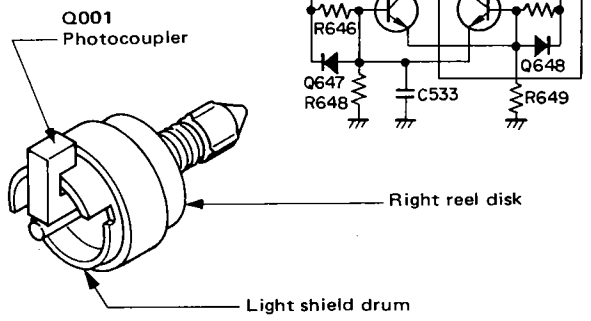
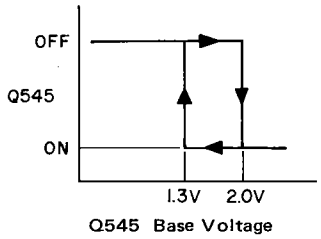


Fig. 3-4 Tapedrive detect mechanism

Fig. 3.3 shows the counter pulse generator circuit which also serves as the tape end detection circuit. Detection of tape end is accomplished by the mechanism shown in Fig. 3.4 When the right reel disk is rotating, the light shield drum attached to the reel disk also rotates.
The light shield drum has two slits; photocoupler Q001 contains a light emission diode and a photo transistor. The light from the light emission diode arrives at the photo transistor only when the slits in the light shield drum pass through the photocoupler, energizing the photo transistor.
When the light is blocked, the photo transistor is OFF. In other words, the photo transistor turns on twice for each rotation of the right reel disk. Since the photo transistor's ON time is not stabilized and since it is de-energized between ON and OFF according to the position of the light shield drum, the waveform of the signal must be shaped by the Schmitt circuit consisting of Q545 and Q546.
As shown in Fig. 3.5, Q545 turns ON when the voltage is below 1.3V. Operation of Q546 is the reverse of Q545.
The shaped output waveform is applied to Pin 6 of Q701.
When the output pulse from Q546 stops in the PLAY, FF or REW mode, the microcomputer detects the end of the tape and the tape stops 1.5-2 seconds later.

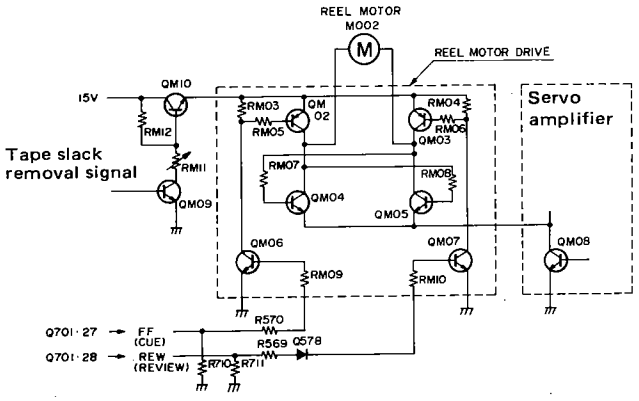
Fig. 3-5 Schmitt operation



3.5 Reel motor drive circuit

(1) Reel motor driver

Fig. 3-6 Reel motor driver



Under normal circumstances, QM09 is OFF and the base of QM10 is biased via RM12. The voltage at the emitter of QM10 is about 14V (load). When a high level FF signal is output from the microcomputer via Q701, QM06 turns ON via R570 and RM09. This reduces the signal level at the collector and thus QM02 turns ON. As a result, a current flows into the base of QM05 which will turn ON.
In the reel motor M002, a current flows along the route QM02 — M002 — QM05 — QM08 so that motor runs in the counterclockwise direction (as viewed from the pulley side) to drive the right reel disk.
The transistor QM08 in the servo amplifier functions as a variable resistor, controlling the reel motor current to provide a constant tape speed (refer to Item 3-8 "I").
In the REW mode, QM07, QM03 and QM04 turn ON. In this case, a current flows into M002 along the route QM03 — M002 — QM04 — QM08, so the motor runs in the reverse direction of this FF mode.

(2) Servo circuit
Refer to Fig. 3.7

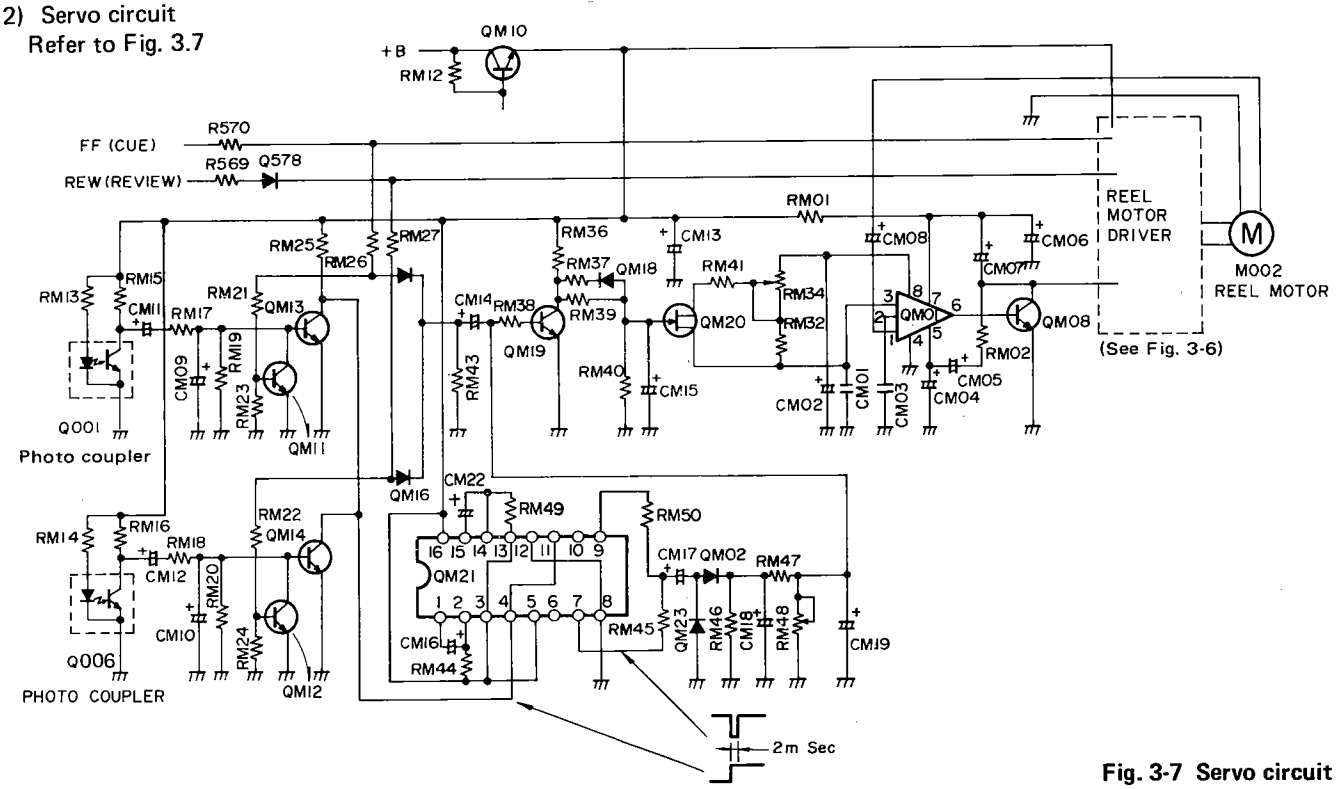


Fig. 3-7 Servo circuit

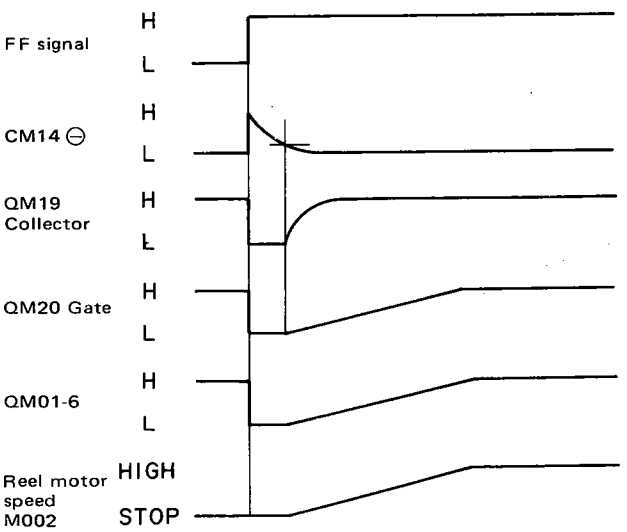
a. Photocoupler Q001 is located on the right reel disk and Q006 on the left reel disk.

b. In the FF mode, a high level signal from the microcomputer passes through R507, RM26 and RM21 to turn QM11 on.
The signal from Q001 is not applied to other circuits as long as the tape is in the FF mode.
In the REW mode, QM12 is ON and the signal to Q006 stops. (The FF mode operation is explained in the following.)

c. In the STOP mode, CM14 and CM19 are uncharged, so the base of QM19 is at the GND level. QM19 is OFF and the collector voltage of QM19 is about 8.2V. When the FF signal of H level is output from the microcomputer, CM19 is charged through RM26, QM15 and CM14. The FF signal also biases QM19 for about 150 msec via RM38. Therefore, QM19 is turned ON and CM15 is quickly discharged through RM37 and QM18.
When the voltage (QM20 gate voltage) charged in CM15 drops, the resistance across the drain and source of QM20 is increased. With this resistance increased, the DC output voltage from Pin 6 of QM01 drops and the QM08 collector current (reel motor current) is decreased. Therefore, the reel motor starts running at a slower speed just after entering the FF mode. When CM14 is charged with the FAST signal, QM19's base voltage drops and the collector voltage is increased. CM15 is charged through RM36 and RM39 with a long time constant so CM20's gate voltage is increased slowly. As the gate voltage is increased, the drain-source resistance is decreased gradually, while QM01's output voltage is slowly increased. Thus, QM08's collector current is increased, thereby increasing the speed of the reel motor gradually. Since the reel motor starts running at a slow speed, the tape will not become slack.

d. In the FF (REW) mode, the tape drive detecting signal is fed from QM14 (QM13) to Pin 4 of QM21. QM21 (μPD4528C) is a unistable multivibrator which outputs low level pulses with a width of about 2 msec, from Pin 7 at the rise of the trigger pulses given to Pin 4. The pulse-width is determined by the power voltage, CM16 and RM44. Refer to Fig. 3.8 for the connection of μPD4528C and its block diagram.

Fig. 3-8-1 Reel motor rising characteristic



e. The output of QM21 is rectified, smoothed and applied to the base of QM19 as a speed control signal. The functions of the servo motor in the FF mode are as follows:

* At the start of tape, the left reel rotates at a slow speed because there is a large amount of tape. When the tape on the left reel is decreased, the speed of the reel is increased gradually and the interval of the input (trigger) pulses from Pin 7 of QM21 becomes shorter.
* With the trigger pulse-interval becoming shorter, the interval of the output pulses from Pin 7 of QM21 also become shorter.
* The interval of the pulses which are differentiated by CM17 and fed to the rectifier circuit become shorter, so the output voltage of the smoothing circuit is increased which increases the voltage at the base of QM19.
* With the QM19 base voltage increased, the collector current is increased, decreasing the collector voltage. Thus, the voltage at the gate of QM20 is lowered.
* With the gate voltage lowered, the drain-source resistance is increased, lowering the QM01 output voltage which decreases the QM08 collector current.
* The QM08 collector current is the current flowing into the reel motor. When this current is decreased, the motor runs at a slower speed.

The reel motor drives the right reel disk. If the motor were to run at a constant speed, the tape would run slowly at the beginning of tape and at very high speed at the end of the tape. The servo motor is used to make the tape speed constant throughout the entire length of the tape by reducing the speed of the reel motor while the tape is running.

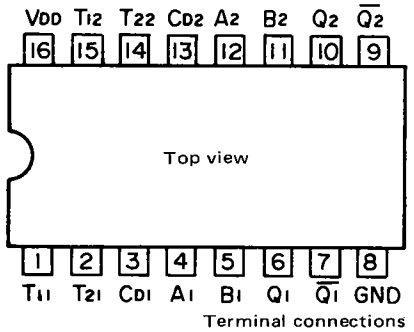
f. The pulse-width and voltages at the beginning and end of tape are as follows:

	Beginning of tape	End of tape
QM21-4 Trigger pulse interval	50 msec	30 msec
CM19 "+" Smoothing circuit output voltage	0.25V	0.62V
QM19 Collector voltage	8.8V	1.7V
QM20 Gate voltage	0.75V	0.15V
QM08 Collector voltage	5.8V	7.8V
Reel motor speed	Fast	Slow

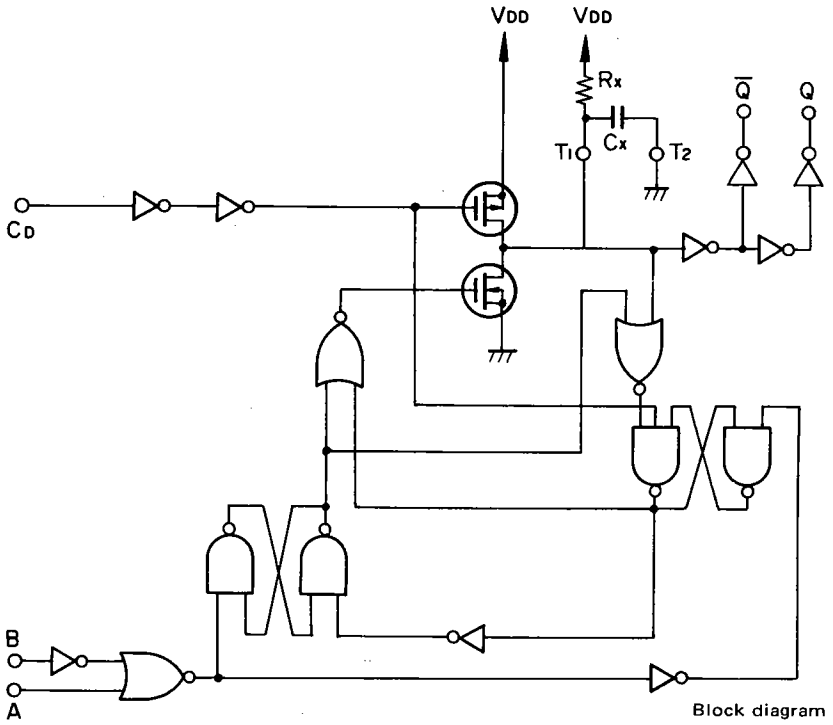
g. The purpose of maintaining the tape speed constant in every fast tape-feeding mode is to ensure stable operation of the program detecting function explained in a later section.

h. The semi-fixed resistor RM34 in Fig. 3.7 is used to determine the maximum speed of the reel motor, while RM48 is used to determine the range of speed of the reel motor or the average speed of the tape.

Fig. 3-8 μPD4528C unistable multivibrator



Terminal connections



Block diagram

3.6 Tape slack removal circuit

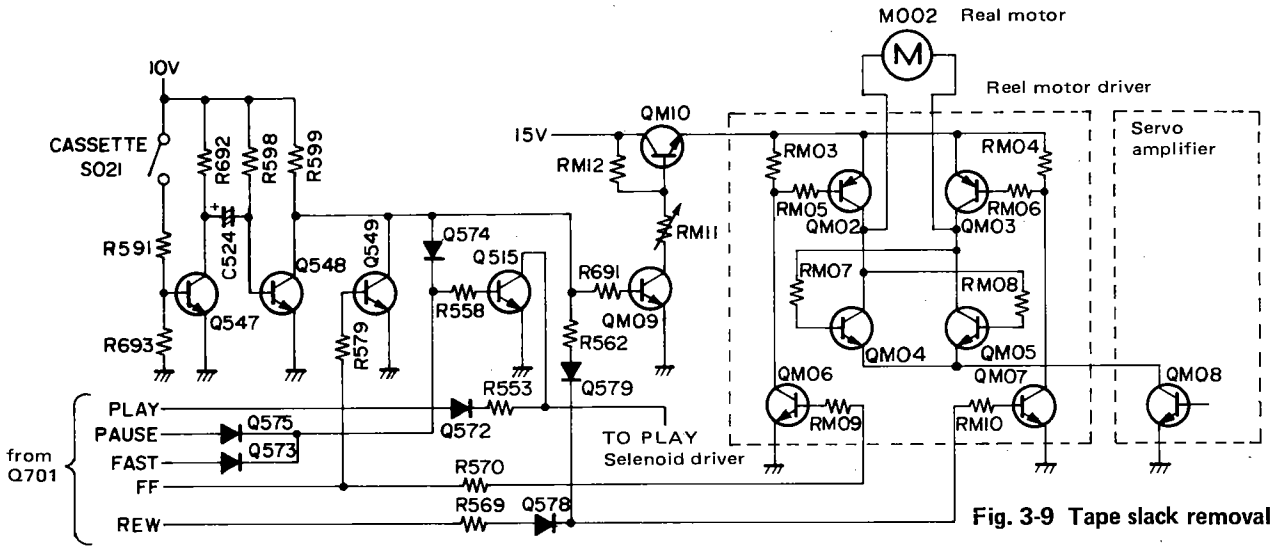


Fig. 3-9 Tape slack removal circuit

If the tape in the cassette is slack, it can result in tangling of the tape in the tape drive mechanism. The SD8000 is equipped with a tape slack removal circuit which removes any slack tape automatically when a cassette is loaded in the tape deck or when the power switch is set to ON (not when backup is power ON). Refer to Fig. 3.9.

When the power of the tape deck is set to ON without a cassette loaded, the cassette IN switch (S021) is open and Q547 is OFF, but Q548 is ON.

When a cassette is loaded, S021 is closed and Q547 turns on. The base of Q548 is grounded through C524 and Q548 turns off for about 1 second.

While Q548 is OFF, a high level signal is output from the collector of Q548 to perform the following functions:

(1) Q515 is switched ON via Q574 and R558 to drop the PLAY signal level to L so that the deck is not set in the PLAY mode until the slack in the tape is removed.

(2) QM09 is switched ON through R691. Therefore, the voltage divided by RM11 and RM12 is applied to the base of QM10, then the emitter output voltage of QM10 drops to about 8V (at unloaded time). As a result, the torque of the reel motor is lowered to prevent the tape from being wound more than necessary.

(3) QM07 is switched ON via R562, Q579 and RM10. QM03 and QM04 are also ON and the same direction as the REW mode.
The left and right reel disks are braked while the tape slack is being removed, but less braking is applied to the left reel base than to the right reel base so the tape is wound onto the left reel with a low driving torque as the slack tape is removed.
When the power is turned on with a cassette loaded (for timer recording, etc.), slack tape is also removed in the same way.
When the PLAY, FF, REW or STOP button is pressed during the tape slack removal operation, the following functions are performed:

(4) PLAY button
Q515 is switched ON and the PLAY signal level is reduced. Slack tape is removed and the tape is set to the PLAY mode after Q522 turns OFF.

(5) FF button
Q549 is switched ON via R579, releasing the tape slack removal operation. The deck is set in the FF mode.

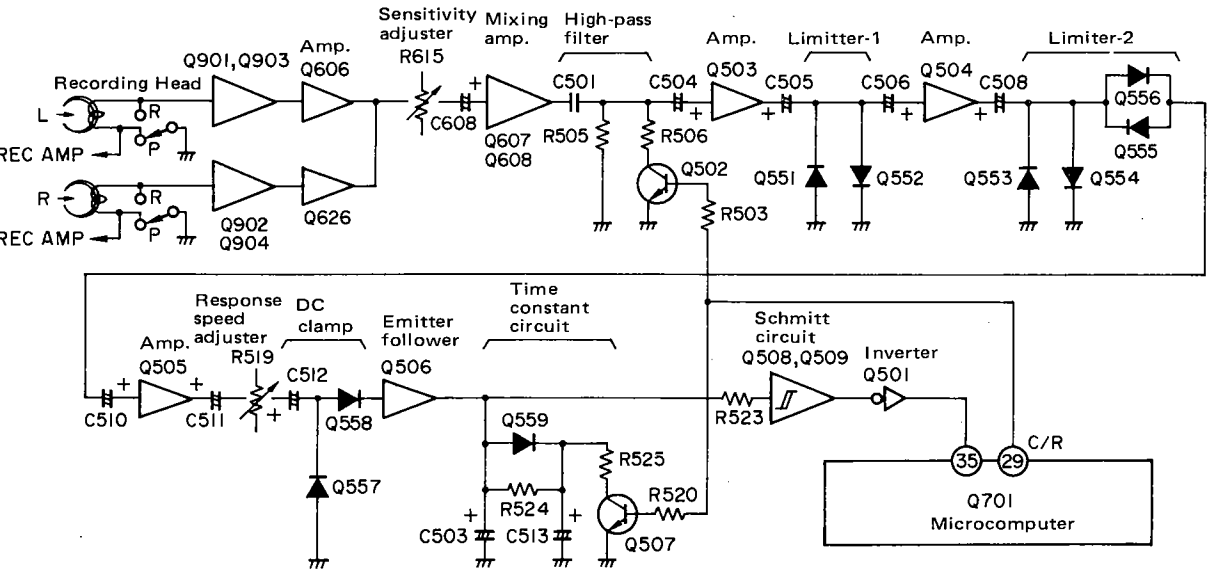
(6) REW button
The deck is set to the REW mode immediately. The torque of the reel motor remains low during the slack tape removal operation.

(7) STOP button
The slack tape removal operation contrinues.

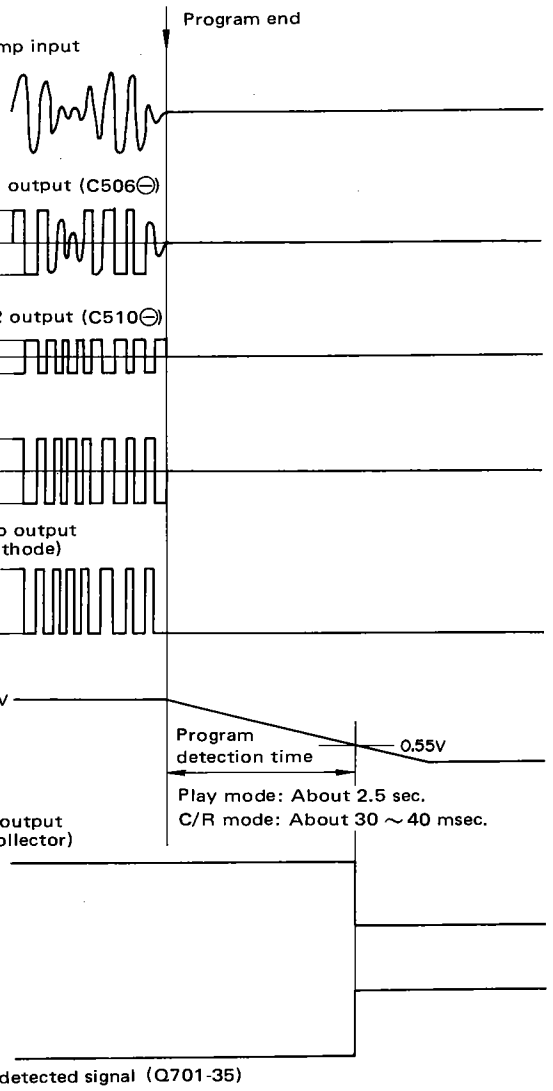
3.7 Tape Speed Selector Circuit

The tape speed in the PLAY or REC/PLAY mode is determined by the speed of the capstan motor (M001). This motor is servo controlled by its FG (frequency generator). The speed is selected by changing the series resistor in the frequency generator.

Fig. 3-10 Program detector circuit block diagram



1 Program detected signal



The program detector circuit detects blank spaces between programs on tape and feeds a high level program control signal to pin 35 of the microcomputer. Fig. 3.10 is a block diagram of the circuit an Fig. 3.11 shows the waveform at each point.

a. The play signals from the Program Detector Pre Amplifiers of the left and right channels are amplified and mixed by Q606 and Q626.
b. The mixed signal is further amplified by Q503 via the sensitivity adjuster and the high-pass filter.
c. The high-pass filter turns on and off Q502 to change the cut-off frequency.
   In the CUE/REVIEW mode, the tape runs faster than in the PLAY mode and the play frequency band is shifted up so Q502 turns on. The cut-off frequency of the high-pass filter is shifted up by inserting R506 in parallel with R505.
   When the tape runs at a high speed as in the CUE/REVIEW Mode, the play signal level is increased. This signal is controlled when R506 is grounded by Q502 and the circuit impedance is reduced.
d. The output signal from Q503 is fed to limiter-1 consisting of Q551 and Q552 to limit the maximum amplitude to about 0.6V.
e. The output of limiter-1 is amplified by Q504 and is fed to limiter-2 consisting of Q553–Q556.
   Amplifier Q504 and limiter-2 amplify low level signals whose amplitude was not limited by limiter-1. When the signal is limited, the play signal is changed to a pulse signal. The amplitude of the output signal of limiter-2 is 0V ± 0.2V.

f. This signal is amplified by Q505 and fed to the DC clamping circuit via the response speed control R519 to shift the input signal from R519, which is deflecting in both the positive and negative directions with respect to 0V, to the positive side without changing its amplitude.
g. The DC shifted signal pulses pass through emitter follower Q506 to charge C503 and C513 in the time constant circuit.
   When recorded tape is being played back, charging pulses are continuously applied to C503.
h. When the signal is present, the charging voltage at C503 is about 0.63V. Q508 and Q509 in the Schmitt circuit are ON and OFF, respectively; Q501 is ON while Q509 is OFF. Pin 35 of the microcomputer is at low level.
i. When left and right channel play signals are not present, the pulses charging C503 stop so C503 discharges into the Schmitt circuit via R523.
   When the potential of C503 drops to about 0.55V, the Schmitt circuit is inverted and Q501 turns off. As a result, a "program detected" signal is applied to Pin 35 of the microcomputer.
j. In the PLAY mode, the program detection time required to apply a detecting signal after the play signal stops is about 2.5 seconds (in other words, a blank space of about 3-5 seconds is required between programs).
k. In the CUE/REVIEW mode, the tape runs at a high speed, so the program detecting time needs to be reduced. In this case, C507 is turned on to discharge C503 and C513 through R525 and Q507 so that a detecting time of about 30 mSec to 40 mSec is obtained.
l. In the CUE/REVIEW mode, if the tape speed varied, the detecting time would vary, resulting in failure to detect programs.
   To prevent this, the reel motor is servo controlled to maintain a constant tape speed.
m. Control R519 is used to adjust the amplitude of the pulses fed to the rectifier circuit. By changing the pulse amplitude, the charging voltage of the time constant circuit is varied together with the detecting time.
n. Recorded signals of which level indicated with the peak level meter exceeds −35 dB are judged as program signal.
   The signal level can be adjusted with R615.

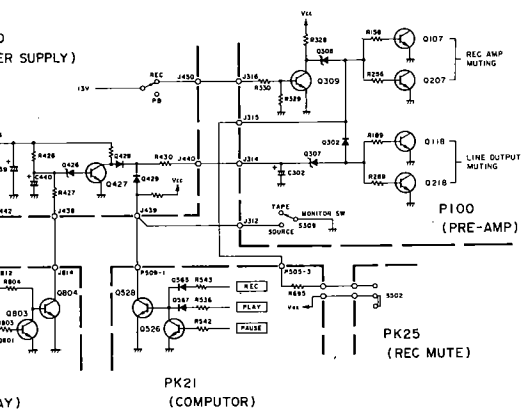
eration

rogramming operation, the mode of tape opera-
not be selected with the pushbuttons.
owing describes the functions of pushbuttons
ted circuits. Unless it is stated otherwise, the
in the STOP mode before any pushbuttons are

mode

e PLAY button pressed, circuit Q701 in the
mputer is set to the PLAY mode and a high level
gnal is output from pin 31. This signal passes
Q572, R553 and R554 to turn on Q516.
time, Q517 is OFF and the signal at the collector
ed from low to high level and the following
ns are performed.
28 is switched ON via R557, R536 and Q536 and
amplifier is set to the PLAY mode (see Fig. 4.1)
llows.

Muting control circuit



cuit:
ower ON, the circuit is activated for about 4 seconds by
uting signal.
cuit:
e power OFF, C440 is discharged for muting.
cuit:
g is effected in any modes other than REC and PLAY.
ng is also effective in REC-PAUSE mode.)
muting is effective in any mode when the monitor SW
100 is in the SOURCE position.
P100:
MUTE is effected during playback so that the signal
the recording circuit does not enter the program de-
r circuit.

a. Q643 is switched OFF and the voltage regulator circuit operates to supply power to the LED meter.
b. Q109 and Q209 are switched OFF to release the muting function of the play output circuit.
c. Q111 and Q211 are switched OFF to release the muting function of the recording output circuit.

(2) Q534 is switched ON for about 0.5 sec via R557, C515 and Q569. In the circuits following Q534, the solenoid drive voltage is selected as discribed previously (Item 3.3).
(3) Q523 and Q527 are switched ON via R557, Q568 and R596. The brake solenoid L002 is activated to release the braking of the reel disks.
(4) Q522 and Q529 are switched ON via R557 and R563. PLAY LED Q591 lights and play solenoid L001 is activated to set the deck in the PLAY mode.

4.2 REC/PLAY mode

The deck cannot be set to the REC/PLAY mode unless ANTI-REC switch S002 is open. Also, the deck cannot be set to this mode manually unless PROGRAM MODE switch S506 is in the OFF/CA position and COUNTER MEMORY switch S504 is in the OFF, REWIND/STOP or REWIND /REPLAY position.

(1) By pressing the PLAY and REC buttons simultaneously, a high level play signal and recording signal are present at Pin 31 and Pin 32 of the microcomputer, respectively. The deck is set to the PLAY mode by the play signal.
The recording signal functions as follows:

a. Q511 is switched ON via Q560, Q530 and R532. Q512 is OFF and Q513 and Q525 are ON.
b. REC LED Q593 is lit by Q513.
c. REC solenoid L004 is activated by Q525. REC/PLAY switches S101 and S102 in the amplifier are set to REC. The amplifier is set to the recording mode.

(2) If, during the PLAY mode, the PLAY and REC buttons are pressed at the same time, the deck is also set to the REC/PLAY mode.
In this case, the following operations are performed, as well as the operations given in a through c.

d. Q512 is switched OFF and the signal at the collector become high level. This signal passes through R535, C514 and Q563 to activate the solenoid drive voltage selector circuit following Q534. Thus, the voltage of the REC solenoid is switched.

(3) With REC/MUTE switch S502 pressed during the REC/PLAY mode, the recording amplifier is muted and hence the recording signal goes off. At this time, the display indicates second's digits automatically regardless of the position of the program setting switch. The display indicates 0-9 seconds repeatedly while S502 is pressed. As explained previously, a blank space of more than 3 seconds is required for proper operation of the program detection circuit, so that length of blank tape can be determined by the time indicated during the REC/MUTE operation.

4.3 PAUSE mode

(1) PLAY/PAUSE
If the PAUSE button is pressed when the deck is in the STOP, FF or REW mode, the PAUSE signal is not output. By pressing the PAUSE button during the PLAY mode, the PLAY signal (Pin 31 of the microcomputer) becomes low level and the PAUSE signal (Pin 31) becomes high level. With this, the tape is set to the STOP mode and the amplifier is muted.
The high level PAUSE signal has the following functions:

a. Q524 is switched ON via R541 and the PAUSE LED Q592 is lit.
b. Q515 is switched ON via Q575 and R558, discharging C522.
c. Q526 is switched ON via R542 (Q526 does not function at this time).
d. Q530 and Q531 are switched ON via R548, Q599 and R692. CUE/REV solenoid L004 is activated by Q531 (in this case, the solenoid drive voltage selector circuit does not operate). The CUE/REV solenoid sets the head base between the STOP and PLAY positions. When the PLAY button is pressed in the PLAY/PAUSE mode, the PAUSE signal level becomes low and the PLAY signal level becomes high.
The PAUSE signal goes off and then the PLAY signal comes on about 25 msec later. CUE/REV solenoid L003 is OFF and PLAY solenoid L001 is ON.

(2) REC/PAUSE
When the PAUSE button or the REC and PAUSE buttons are pressed in the REC/PLAY mode, the tape is set to the REC/PAUSE mode. In either the REC/PLAY or REC/PAUSE mode, the REC signal is output and the amplifier is set to the recording mode. Other functions are the same as in the PLAY/PAUSE mode.

4.4 FF mode

When the FF button is pressed, FF and FAST signals are output from Pin 27 and Pin 26 of the microcomputer, respectively.
The FF signal has the following functions:

a. Q549 is switched ON via R579. The slack tape removal circuit stops operating when Q549 is ON.
b. The reel motor drive circuit is activated via R570.
The FAST signal has the following functions:
c. Q515 is switched ON via Q573 and R558 to disable the PLAY signal circuit.
d. Q510 is switched ON VIA R531 to disable the REC signal circuit.
e. Q534 is switched ON momentarily via R559, C516 and Q576 to operate the solenoid drive voltage selector circuit.
f. Q523 and Q527 are switched ON via R559, Q571 and R596 to operate BRAKE solenoid L002.

4.5 REW mode

When the REW button is pressed, the REW signal and FAST signal are output from Pin 28 and Pin 26 of the microcomputer, respectively. The functions of these signals are practically the same as in the FF mode.

4.6 STOP mode

In any of the following cases, the deck is set to the STOP mode during any mode other than the program mode.

a. When the STOP button is pressed.
b. When the SENSOR STOP switch is pressed.
c. When the tape reaches its end.
d. When PROGRAM MODE switch S506 is set from the SINGLE position to the OFF/CA position.
e. When the COUNTER MEMORY switch S504 is set from the PLAY/STOP position to the OFF position with the PROGRAM MODE switch in the OFF/CA position.

During the program mode operation, the SENSOR STOP switch does not function. When unloading the cassette, the program mode operation is stopped and the tape deck is set to the STOP mode. The program mode operation stops by the procedures given in the above items d ane e.

4.7 Mode transfer

When the mode of operation is transferred from A to B, the signal in Q701 goes off and then the B signal is output on about 25 to 30 msec later. The tape deck is in the STOP mode until the B signal is output.
When the mode of operation is changed, the tape stops once and then starts again.

4.8 Functions of operation buttons

When more than one operation button are pressed, the priority of the mode is determined by the microcomputer. Except when the PLAY and PAUSE buttons are pressed, the tape mode is determined by the button which is released last. The relationship between the operation buttons and the modes of operation is as follows:

a. STOP button and any one of REW, FF, PLAY, PAUSE and REC buttons . . . STOP mode.
b. REW button and FF button . . . STOP mode.
c. REW (or FF) button and any one of PLAY, PAUSE and REC buttons . . . REW (or FF) mode.
d. PLAY button and PAUSE button
(1) When the PLAY button is pressed first . . . PLAY mode (or the mode of the button released last).
(2) When the PAUSE button is pressed first . . . STOP mode (STOP mode when the PLAY button is released first, and PLAY mode when the PAUSE button is released first).

5. Programming

Fig. 2.4 shows the program signal input circuit. The switches in the matrix circuit, program memory and control signal output are controlled by the microcomputer.

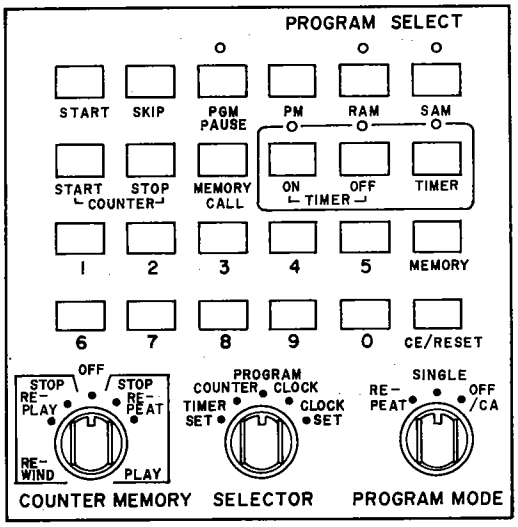
This section explains the operating conditions of the program setting switches and related functions.

The program setting switches have various functions, so special care should be taken when checking for circuit trouble or misoperation.

5.1 Matrix keys

Here, the functions of the program setting matrix keys are explained. For the functions of the 3 switches (COUNTER MEMORY, SELECTOR, PROGRAM MODE) at the lower part of the program setting unit, refer to Section 5-2 and succeeding sections.

Fig. 5-1 Program setting unit



(1) START

This is a program mode start command key.

When the PROGRAM MODE switch is in the SINGLE or REPEAT position and the COUNTER MEMORY switch is in the PLAY/STOP or PLAY/REPEAT position, press the START key and the deck is set to the REW mode regardless of the position of the SELECTOR switch and the information stored in the memory.

(2) SKIP

This key is used to shift from one program to another during program mode operation.

When the PROGRAM MODE switch is in the SINGLE position and the last designated program is being played back, pressing the SKIP key causes the tape deck to enter the STOP mode.

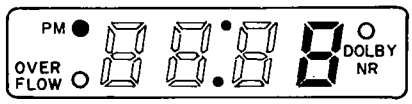
(3) PRG PAUSE

This is the PROGRAM PAUSE key. Press this key during the program mode operation and the tape stops briefly. To resume tape playback, press the same key again.

(4) PM

This key is used to indicate the PM (afternoon) sign on the display. It functions only when the SELECTOR switch is in the CLOCK SET position. By pressing the PM key, the display indicates as shown in Fig. 5.2.

Fig. 5-2 Indication when PM key is pressed



(5) RAM, SAM

These are RANDOM ACCESS MEMORY key and SEQUENTIAL ACCESS MEMORY key, and are used for memorizing, executing and reading programs.

When the RAM key is used, the programs are executed in the order in which they are arranged. When the SAM key is used, the programs are executed in numerical order. If the programs are arranged in the order of 4, 5, 3, 2 and 1, they are executed (readout) by the memory as shown in Table below.

	Read-in	Read-out, Execution	
Mode	Sequence	Mode	Sequence
RAM	4 – 5 – 3 – 2 – 1	RAM	4 – 5 – 3 – 2 – 1
		SAM	1 – 2 – 3 – 4 – 5
SAM	4 – 5 – 3 – 2 – 1	RAM	4 – 5 – 3 – 2 – 1
		SAM	1 – 2 – 3 – 4 – 5

The LEDs on the RAM and SAM keys indicate the memory being executed. They will light with the PROGRAM MODE switch in the SINGLE or REPEAT position.

(6) COUNTER/START, STOP

This is used to set the start and stop positions for counter, memory and play operations (STOP, REPEAT).

(7) MEMORY CALL

This is used to check the information stored in memory. It has no effect on the programs being executed and tape deck operation. To cancel memory call, press the MEMORY key. When the CE/RESET key is pressed while the memory is recalled by pressing the MEMORY CALL key, the information in the memory is reset and cleared.

a. Recalling the programs

The preset programs can be recalled when the SELECTOR switch is in the PROGRAM position and the PROGRAM MODE switch is in the SINGLE or REPEAT position. For example, if programs are preset in the RAM in the order of 4, 5, 3, 2 and 1 and the MEMORY CALL key is pressed, the memory is recalled and the display is as shown in the Table below. In this example, the indication is clear from the 6th position, indicating that all the programs have been executed. If no programs are stored in the memory, the indication goes off when the MEMORY CALL key is pressed.

Table 5-2 Program call and indication (example)

Memory call pressed	1st	2nd	3rd	4th	5th	6th	7th	8th	9th
Indication	04	05	03	02	01	Cleared	04	05	03

b. Recalling the counter memory

The information in the counter memory is recalled with PROGRAM MODE . . . OFF/CA, SELECTOR . . . COUNTER, COUNTER MEMORY . . . PLAY/STOP or PLAY/REPEAT.

The start count and stop count informations are recalled and displayed alternately each time the MEMORY CALL key is pressed. When no information is stored in the memory, the display is "000".

c. Recalling the timer settings

The timer-on time and timer-off time are recalled and indicated alternately each time the MEMORY CALL key is pressed while the SELECTOR switch is in the TIMER SET position. The LEDs in the TIMER/ON and TIMER/OFF keys will light alternately to indicate which memory is recalled. If the POWER switch is OFF and the timer start is in the standby mode, the memory recall function is not done. If the TIMER switch (S503) position is changed when recalling timer-on or timer-off timer memory, the memory recall is reset and the actual time is indicated.

(8) TIMER/ON, OFF, TIMER

These 3 keys are used to set the timer.

a. TIMER/ON

Press this key when setting the timer start time. The start time can be set only when the SELECTOR switch is in the TIMER SET position. When the time is set, the LED above the key will light.

b. TIMER/OFF

Press this key when setting the timer stop time. The stop time can be set only when the SELECTOR switch is in the TIMER SET position. When the time is set, the LED above the key will light.

c. TIMER

This key is used to start and stop the timer. Press the key and the LED above the key will light to indicate that the timer is started. If the TIMER/ON or TIMER/OFF key or both are set, the LED above each key will light. When the TIMER key is pressed again, the LED goes off and the execution command is cleared.

If the TIMER/ON or TIMER/OFF key is not set, the LED will not light when the TIMER key is pressed and the timer will not operate.

When either the TIMER/ON or TIMER/OFF key is set, the timer starts operating when the TIMER key pressed regardless of the positions of the COUNTER MEMORY, selector and PROGRAM MODE switches, thus executing the timer operation. (Timer recording is not performed unless the COUNTER MEMORY is OFF and the PROGRAM MODE is OFF/CA.)

(9) 1–0

These keys are used to set program number, timer and count signals.

a. For example the figures "4, 3, 2, 1" can be set by pressing the keys 4, 3, 2 and 1 in that order.

To set figures "5:30", press the keys 5, 3 and 0 in that order.

b. In setting the count or timer, a maximum of 4 figures can be keyed in. In setting the program number, a maximum of 2 figures. Excess key-in is refused by the microcomputer.

c. If two or more keys are pressed, only the figure designated by the key first pressed is input. No signals are input by other keys while one key is depressed. When the signal is input, the count, time and sequence are indicated in the display. When the figures indicated are stored in the memory of the microcomputer by pressing the MEMORY key, the setting is completed.

(10) MEMORY

This key is used to store the figures preset in the display in the memory of the microcomputer. It is also used to reset in the memory recall operation.

NOTE: All the figures preset in the display may not be stored in the memory because of "error" or "overflow" (refer to section 5-3 "CLOCK SET, PROGRAM").

(11) CE/RESET

This is the CLEAR ENTRY/RESET key. It is used to clear, indicate and reset the information stored in the memory. For details, refer to section 5-2 and subsequent sections.

5.2 PROGRAM MODE Switch (S506)

(1) OFF/CA

CA represents CLEAR ALL. Use the OFF/CA position of the PROGRAM MODE switch referring to the section 5.3.

When the switch is set from SINGLE to OFF/CA (or from OFF/CA to SINGLE and to OFF/CA), the following functions are performed according to the conditions of the tape deck and the microcomputer.

a. The tape deck is set to the STOP mode.

b. Program mode operation is cancelled and the deck is set to the STOP mode. The programs are cleared from the memory.

c. The memory call is cleared and the following is indicated:
SELECTOR switch in PROGRAM position: 00
SELECTOR switch in COUNTER position: 0000
SELECTOR switch in TIMER SET position: Actual time

(2) SINGLE

In this position, the preset programs are played once.

(3) REPEAT

In this position, the preset program are played repeatedly.

5.3 SELECTOR Switch (S505)

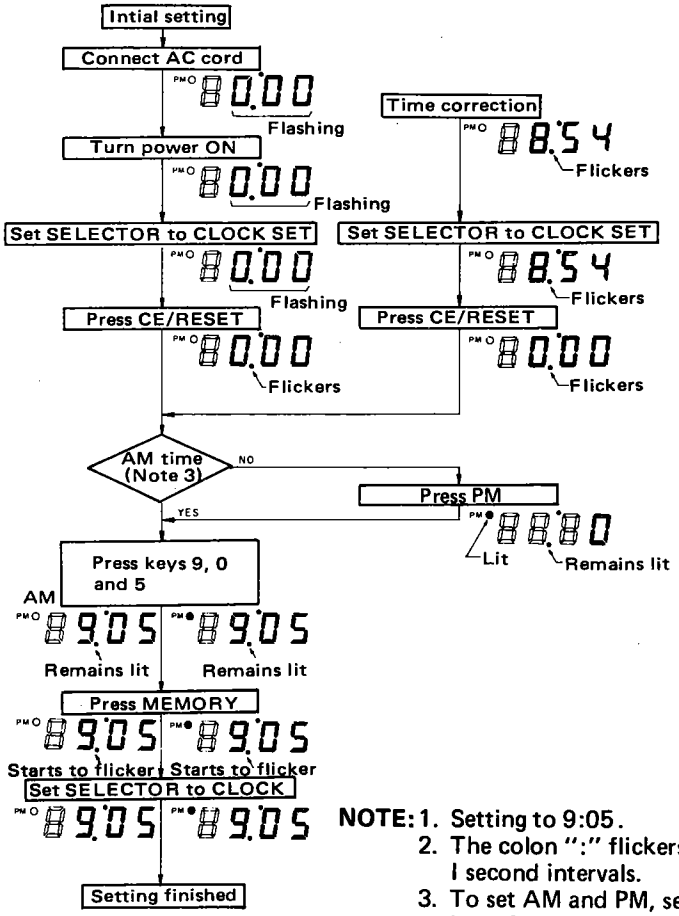
(1) CLOCK SET

When setting time, the switch should be placed in this position. Make sure that the POWER switch is ON. If it is OFF, the clock set input signal is not fed to the memory circuit of the microcomputer.

Time can be set regardless of the positions of the PROGRAM MODE and COUNTER MEMORY switches.

a. For setting the clock, follow the procedures shown in Fig. 5.3.

Fig. 5-3 Clock set flow chart



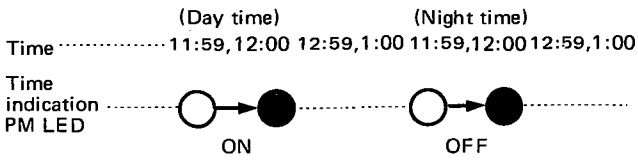
NOTE: 1. Setting to 9:05.
2. The colon ":" flickers at I second intervals.
3. To set AM and PM, see item C, section 5-3.

b. In any of the following cases, an error signal is generated and the display flashes at about 0.3 second intervals when the MEMORY key is pressed.
* Hours digits are not 1-12.
* Minutes digits are over 60.

If an error signal is given, press the CE/RESET key to reset the clock.

c. The clock indicates time 1:00 through 12:59. PM and AM signs are indicated by LEDs. The relationship between the time and PM LED is as follows:

Fig. 5-4 Time indication and PM LED



The clock does not indicate hours between 0:00 and 1:00 AM (or PM).

d. The time indicating reference signal is obtained by dividing the power frequency, so the frequency selector switch on the rear of the tape deck should be set to the correct power frequency.

At the completion of clock setting, be sure to set the SELECTOR switch to the CLOCK position to prevent the setting from being changed if any key is pressed by mistake.

(2) CLOCK

When the SELECTOR switch is in the CLOCK position, the digital display functions as a clock. With the POWER switch OFF, time is indicated regardless of the position of the SELECTOR switch.

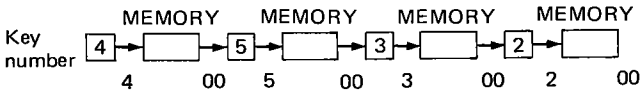
When power is restored after a power failure, the clock is reset to "0:00" and the time indication flickers but the clock remains operating. If the indication "0:36" is flickering, it means that it is 34 minutes after a power failure.

(3) PROGRAM

3-1. Program Setting

a. Set the POWER switch to ON and the SELECTOR switch to PROGRAM.
   The display indicates 00.
b. Set the PROGRAM MODE switch to SINGLE or REPEAT.
c. The COUNTER MEMORY switch may be set to any position, since it is independent of program operation.
d. Press the RAM or SAM key. The LED above the key will light.
   RAM: Memory call and playback operations are carried out in the order of program setting.
   SAM: Memory call and playback operations are carried out in the sequential order of the program number, regardless of the order of program setting.
e. Set the desired programs.
   Store the desired program numbers in the memory in the desired playback order. For example, if programs 4, 5, 3 and 2 are to be played in that order, use the keys as follows:

Fig. 5-5 Programming sequence

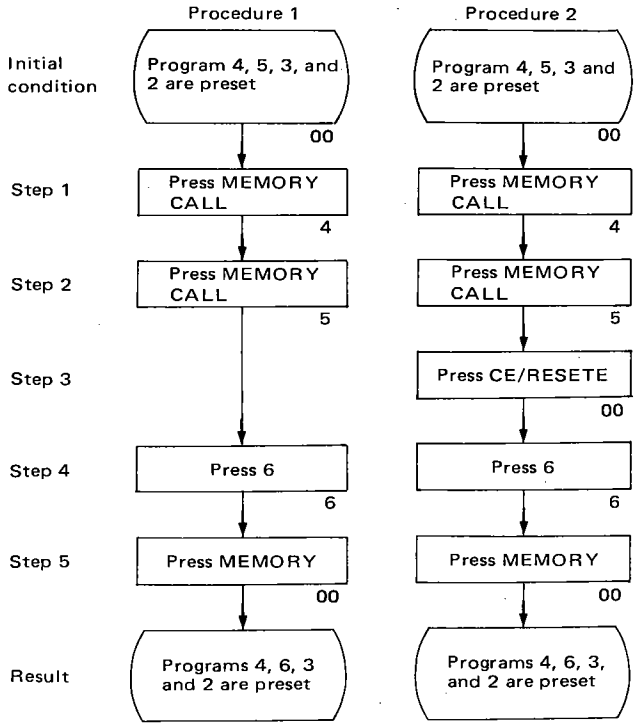


f. A maximum of 18 programs can be preset. If 19 or more programs are preset and then the MEMORY key is pressed, an error signal is developed, causing the display to flicker at about 0.3 second intervals.
g. A maximum of 19 programs can be preset provided that the program number is less than 18. The same programs can be preset as many times as desired. Up to 19 programs can be stored in memory.
   If the MEMORY key is pressed to store 20 programs, overflow occurs, causing the overflow LED to flicker. By pressing the CE/RESET key, it stops flickering and the display indicates 00.
h. To check the programs stored in memory, press the MEMORY CALL key. To stop the memory recall operation, press the MEMORY key. Note that the program indicated on the display is cleared if the CE/RESET key is pressed.
i. When changing the program arrangement, proceed as follows:

1) Change of all programs
   * Set the PROGRAM MODE switch to OFF/CA and then set to SINGLE or REPEAT.
   * Remove the cassette from the tape deck and re-insert it.

   In either case, all the programs are cleared, permitting new programs to be preset.
2) Addition of programs
   If any programs need to be added to the preset programs, press the MEMORY key to indicate 00 on the display, then follow the procedures noted in item "e".
3) Insertion of programs
   Insertion of any other programs in the preset programs (for example between 4, 5, 3 and 2) is not possible; for example, programs 6 and 7 cannot be inserted between programs 4 and 5.
   In this case, all the previous programs should be cleared.
4) Program replacement (1)
   To replace preset programs (for example, 4, 5, 3 and 2) with other programs (for example 4, 6, 3 and 2), there are two different methods as shown in Fig. 5.6. In either method, the result is the same but the operating conditions of the memory is different.
   In the procedure 1, when the program correction is stopped after steps 2 and 4, the information in the memory remains the same and program 4, 5, 3 and 2 are left in the memory.

Fig. 5-6 Program replacement method (1)



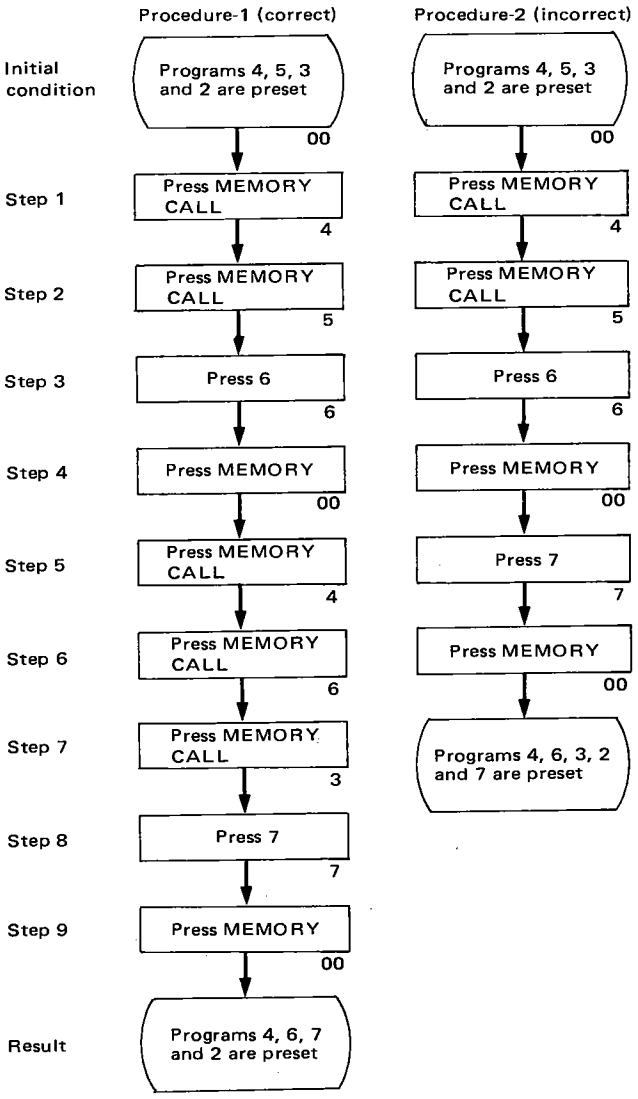
In the procedure 2, when step 3 is executed, the previous program 5 is cleared. So, if the program correction is stopped after steps 3 and 4, the programs 4, 3 and 2 are left and, therefore, program 6 cannot be inserted between programs 4 and 3.

5) Program replacement (2)

Here, the method of replacing programs 4, 5, 3 and 2 with programs 4, 6, 7 and 2 (In practice, it is advisable to clear all the previous programs) is explained. Refer to Fig. 5.7.

In procedure 2, suppose that program 5 has been preset by mistake. By pressing the MEMORY key, program 6 is preset in memory where program 5 was preset and, at the same time, memory recall is cancelled.

Fig. 5-7 Program replacement method (2)



After program 6 has been preset, memory is set in the standby mode at the position next to the last program (the blank space next to program 2).

Therefore, if program 7 is preset after program 6, the programs preset are 4, 6, 3, 2 and 7.

When program 7 is preset according to procedure 2, the result is the same as in the case of the addition of programs.

j. Once the programming has been completed, the programs remain in storage regardless of the position of the SELECTOR switch.

3-2. Program Execution

a. Programs are executed in playback only.

b. Set the PROGRAM MODE switch to the SINGLE or REPEAT position.

SINGLE: The tape stops after all the preset programs are played.

REPEAT: The preset programs are played repeatedly.

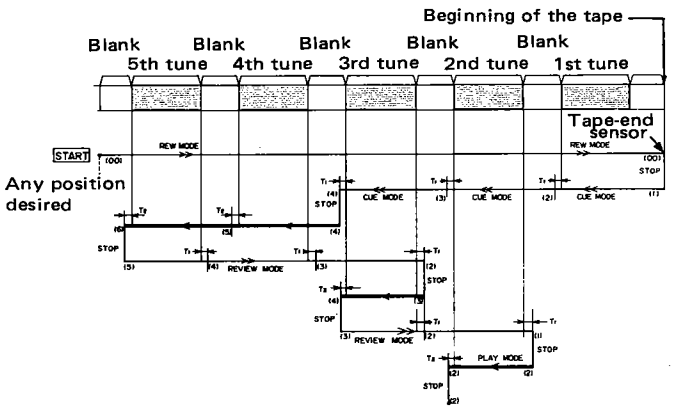
c. Select either RAM or SAM.

RAM: Programs are played in the order in which they are preset.

SAM: Programs are played in numerical order. When the same program is preset twice or more, it is played as many times as it is preset.

d. By pressing the START key, the tape is rewound to the beginning to detect the tape end. This is necessary to determine the starting position of the tape. When the tape reaches the beginning, the tape deck stops once and then plays the programs. Fig. 5.8 shows the operation of the tape deck when programs 4, 5, 3 and 2 are preset (the PROGRAM MODE switch is set to SINGLE and the MEMORY switch set to RAM).

Fig. 5-8 To excute the programmed function



NOTE:

1. Programs 4, 5, 3 and 2 are preset (RAM, SINGLE).
2. Program detection time (about 2.5 sec) at T1 = PLAY mode.
3. Program detection time (about 30–40 mSec) in CUE/REVIEW mode.
4. The figures in ( ) show program numbers.

When the first program is 1, the tape deck is set to the PLAY mode. When it is not 1, the tape deck is set to the CUE mode.

The program detector circuit detects the end of each program and the program number is counted. When the tape reaches program 4, the tape deck stops and then starts playing the program. At the end of program 4, the blank space between the programs is detected and the program number is counted up one step to play program 5. At the end of program 5, the tape is rewound to program 3. The tape deck stops and then plays program 3. The display indicates 3.

At the end of program 3, the tape is rewound again to play program 2. At the end of program 2, the tape deck stops and the display indicates the last program number.

e. To ensure stable program operation, the sensitivity and response of the program detection circuit and the tape speed in the CUE/REVIEW mode should be stabilized (refer to section 3.8).
f. During playback, the display indicates the number of the program being played.
g. To stop any program being played to play the next program, press the SKIP key. The tape advances to the beginning of the next program and this program is played.
h. To stop the tape temporarily during playback, press the PMG PAUSE key. To resume playback, press the same key again.
i. During the execution of the programs, the REW, STOP, FF, PLAY and REC keys will not function. The SENSOR STOP switch is also inoperative.
j. To stop the program operation, set the PROGRAM MODE switch to the OFF/CA position.
k. Once the programs are stored in memory, they can be played by pressing the START key regardless of the positions of the COUNTER MEMORY switch and SELECTOR switch. At this time, the PROGRAM MODE switch should be in the SINGLE or REPEAT position.
l. By using the timer, the programs can be played at any desired time. For details, refer to section 5.5.

(4) COUNTER

The digital indicator functions as a tape counter when the SELECTOR switch is in the COUNTER position.
The counter signal is fed from photocoupler Q001 interlocked with the right reel disk to drive the up/down counter in the microcomputer.
The counter keeps operating as long as the tape is running.
With the switch in the COUNTER position, the start/stop count of the counter memory play also functions.

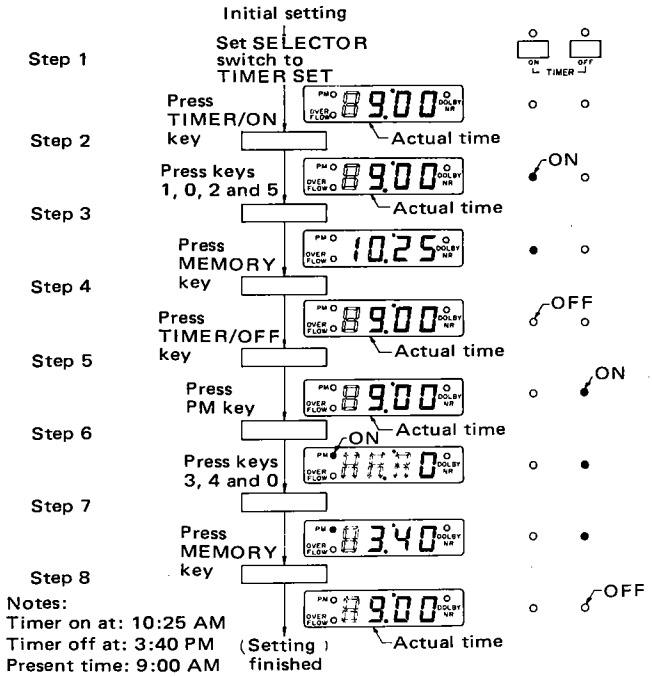
1. Tape counter:
   a. The tape counter indicates 0000 through 9999.
   b. In the PLAY FF or CUE mode, the count is increased. In the REW or REVIEW mode, the count is decreased.
   c. The counter increases/decreases by two for every rotation of the right reel disc.

2. Counter reset:
   a. Pressing the CE/RESET key, the counter is reset to 0000.
   b. The counter is reset when CE/RESET key is pressed. If it is reset while the tape is moving, the counter is reset to 0000 and then starts counting even if the CE/RESET key is kept depressed.
   c. The counter will not be reset until the power of the tape deck is switched OFF unless the CE/RESET key is pressed.
3. Setting of start/stop count:
   For the functions of the counter memory play, refer to section 5.3.
   a. Set the SELECTOR switch to the COUNTER position.
   b. Set the PROGRAM MODE switch to the OFF/CA position.
   c. Set the COUNTER MEMORY switch to the PLAY/STOP or PLAY/REPEAT position.
   d. Set the counter to the desired starting point. To start it from 100, press the following keys: COUNTER/START, 1, 0, 0, MEMORY.
   e. Set the counter to the desired stopping point. To stop it at 300, press the following keys: COUNTER/STOP, 3, 0, 0, MEMORY.
   f. The counter can be set in the above way even if the procedures in times d and e are reversed.
   g. By pressing the MEMORY CALL key, the preset count can be indicated. Pressing the key once (or an odd number of times), the start count is indicated. Pressing twice (or an even number of times), the stop count indicated.
   h. To change the preset count, recall the count to be changed by pressing the MEMORY CALL key, then input a new count. Then press the MEMORY key.
   i. The start/stop count preset is reset when the COUNTER MEMORY is set to the OFF position or the cassette is removed.
   j. The start/stop counter can be used in combination with the timer. For details, refer to section 5.5.

(5) TIMER SET

The tape deck can be started and stopped at any desired time by using the clock built into the tape deck. Set the SELECTOR switch to the TIMER SET position to set the start and stop time. For the timer play and recording operations, refer to section 5.5.
To set the time, proceed as follows:
a. Set the SELECTOR switch to the TIMER SET position. The time is set regardless of the positions of other switches.
b. When setting the time, refer to Fig. 5.9.
   Even when steps 5.8 are executed between steps 1 and 2, the result is the same.

Fig. 5-9 Timer-setting procedure

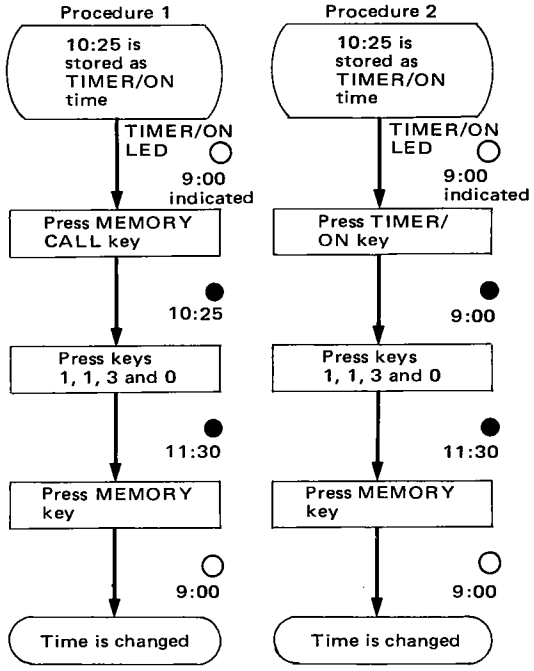


c. For setting AM or PM, refer to section 5.3(1) C and Fig. 5.4.

d. To check the set time, press the MEMORY CALL key. The time is indicated in the digital display. TIMER/ON or TIMER/OFF can be seen from the LEDs above the keys.
When the TIMER switch (S503) is set to another position, the memory recall is reset and the actual time is indicated.

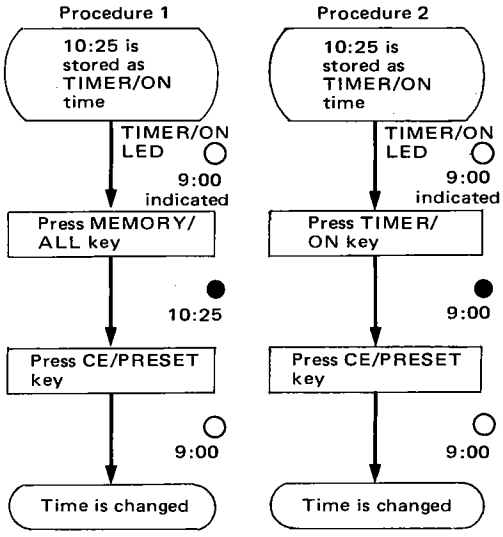
Fig. 5-10 Timer-setting change procedure

* TIMER/ON time 10:25 is changed to 11:30.
* Actual time is 9:00.



e. To change the set time, refer to Fig. 5.10.

Fig. 5-11 Timer-setting clear procedure



* TIMER/ON time 10:25 is cleared.
* Actual time is 9:00

f. To clear the set time, refer to Fig. 5.11.
Unless the set time is cleared, it is retained until the power supply of the tape deck is turned off.

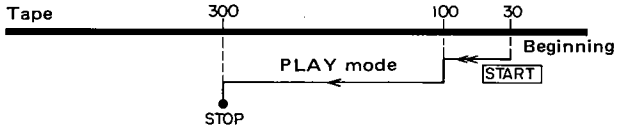
5.4 COUNTER MEMORY Switch (S504)

(1) PLAY/STOP

With the COUNTER MEMORY switch in the PLAY/STOP position and the PROGRAM MODE switch in the OFF/CA position, press the START key.
The tape will be played from the position set by the counter/start switch and stops under the control of the same switch.
When the start count is set to 100 and the stop count is set to 300, the tape deck functions as follows (the SELECTOR switch has no effect on tape playback as long as the start/stop count is stored):

a. Tape count is below 100 (example: 30):
* By pressing the START key, the deck is set to the FF mode.
When the tape count reaches 100, the tape stops and then starts playing. When the tape count reaches 300, the deck is set to the STOP mode (Fig. 5.12).

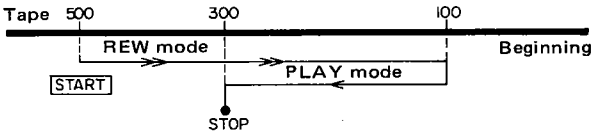
Fig. 5.12 Count is below start count



* During playback, if the tape reaches its end before the counter indicates 300, the tape stops at that point.

b. Tape count is above 100 (example: 500):
* By pressing the START key, the deck is set to the REW mode and wound back to 100. At this point, the tape stops and then starts playing.
The tape stops at 300 (Fig. 5.13).

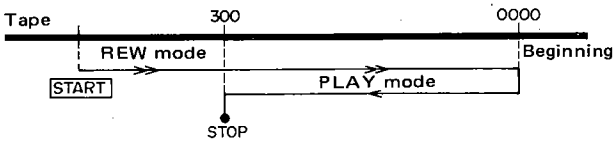
Fig. 5.13 Count is above start count



* During the REW mode, if the tape reaches its end before the counter indicates 100, the tape stops at that point.

c. Start point is not set (0000):
* By pressing the START key, the deck is set to the REW mode.
When the count reaches 0000, the tape stops and then starts playing. The tape stops at 300 (Fig. 5.14).

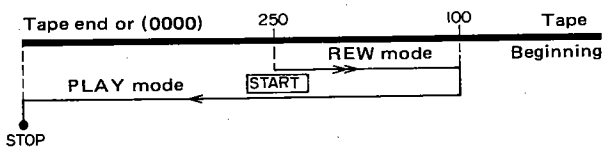
Fig. 5.14 Start count is not set



When the tape reaches its end before the counter indicates 0000, the tape stops at that point.

d. Stop point is not set:
   * By pressing the START key, the tape begins play from 100 as in the above items "a" and "b". The tape is played to the end and then stops (If the start count is set to a large figure such as 9900, the tape stops when the counter reaches 0000 after 9999). Refer to Fig. 5.15.

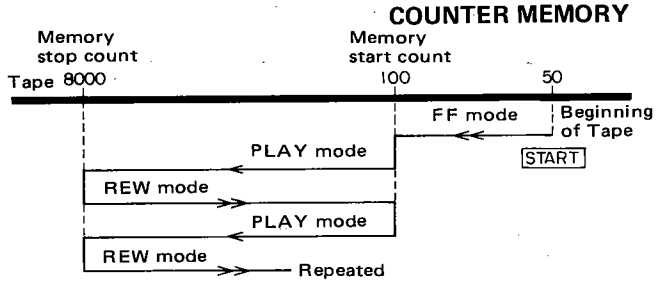
Fig. 5.15 Stop count is not set



e. During counter-controlled operation, the operating buttons will not function. To stop the tape temporarily during playback, press the PMG PAUSE key. To resume playback, press the same key once again.
f. To stop the tape deck after releasing counter-controlled operation, set the COUNTER MEMORY switch to the OFF position.
g. During counter-controlled operation, if the PROGRAM MODE switch is set to the SINGLE or REPEAT position, and tape will be rewound. The tape stops at the end of the tape. When the switch is set to the OFF/CA position during the REW mode, the tape stops at that point (the memory is retained).

(2) PLAY/REPEAT
In this position, the tape plays repeatedly between the start count and stop count (Fig. 5.16).
To release the PLAY/REPEAT mode, set the COUNTER MEMORY switch to the OFF position.

Fig. 5.16 PLAY/REPEAT Operation by COUNTER MEMORY



(3) OFF
In this position, playback under control of the counter memory is released and, at the same time, the start and stop counts stored in the memory are cleared.
When the COUNTER MEMORY switch is in the OFF position, timer recording is not possible. Refer to section 5.5.

(4) REWIND/STOP
When the COUNTER MEMORY switch is in the REWIND/STOP position and the PROGRAM MODE switch is in the OFF/CA position, the tape deck functions as follows:
a. By pressing the REW key, the tape is rewound to a counter reading of 0000.
b. When the tape reaches its end during the REW mode before the counter indicates 0000, the tape stops at that point.
c. During the REW mode, the tape also stops in the following cases:
   1) The STOP button is pressed.
   2) The SENSOR STOP button is pressed.
   3) The PROGRAM MODE switch is set from OFF/CA to SINGLE and to OFF/CA.
   4) The CE/RESET key is pressed when the SELECTOR switch is in the COUNTER position.
   5) The COUNTER MEMORY switch is set to the PLAY (STOP, REPEAT) position and then to the OFF position.

(5) REWIND/REPLAY
The basic functions of the tape deck are the same as in the item (4) REWIND/STOP. In the case of items "a" and "C-4", the tape stops once and then begins to play. The tape stops at the end of the tape.

5.5 TIMER Switch

The TIMER switch is used to control the operation of the tape deck at the designated time. By using the timer in combination with the PROGRAM MODE switch and COUNTER MEMORY switch, the tape can be set in the program operation or counter memory play operation. For use of these switches, refer to the item (5) and subsequent items. The timer on/off function also allows control of AC power supplied to external devices connected to SD8000.

Refer to item (5) and subsequent items for the power supply control.

The following items (1) through (5) are related to the timer cycle (OFF-ON-OFF) that starts and stops the tape deck at designated times. Unless otherwise specified, the PROGRAM MODE switch should be in the OFF/CA position and the COUNTER MEMORY switch in the OFF position.

(1) REC

When all the following conditions are met, the TIMER/REC LED on the switch is lit to indicate that the deck is ready for timer recording.

* A cassette with erasure prevention tab is loaded.
* The PROGRAM MODE switch is in the OFF/CA position.
* The COUNTER MEMORY switch is in the OFF position.
* The TIMER switch is in the REC position.
* The TIMER key is pressed to operate the timer (LED above the TIMER key is ON).

Check that the TIMER/RED is ON. The tape is set to the REC/PLAY mode at the timer-on time and stops at the timer-off time.

If the cassette has no erasure prevention tabs, the tape is set to the PLAY mode at the timer-on time (In the REC position, the tape is also set to the PLAY mode even when the tape deck is in COUNTER MEMORY operation or PROGRAM operation).

(2) OFF

In this position, the power supply of the external devices can be controlled by using the timer built into the SD8000. The tape deck is in the STOP mode in this position, but it can be operated if desired.

(3) PLAY

The tape is set to the PLAY mode at the timer-on time and stops at the timer-off time.

(4) CIRCUIT OPERATION

Refer to Fig. 5.17.

Fig. 5.17 Timer Curcuit

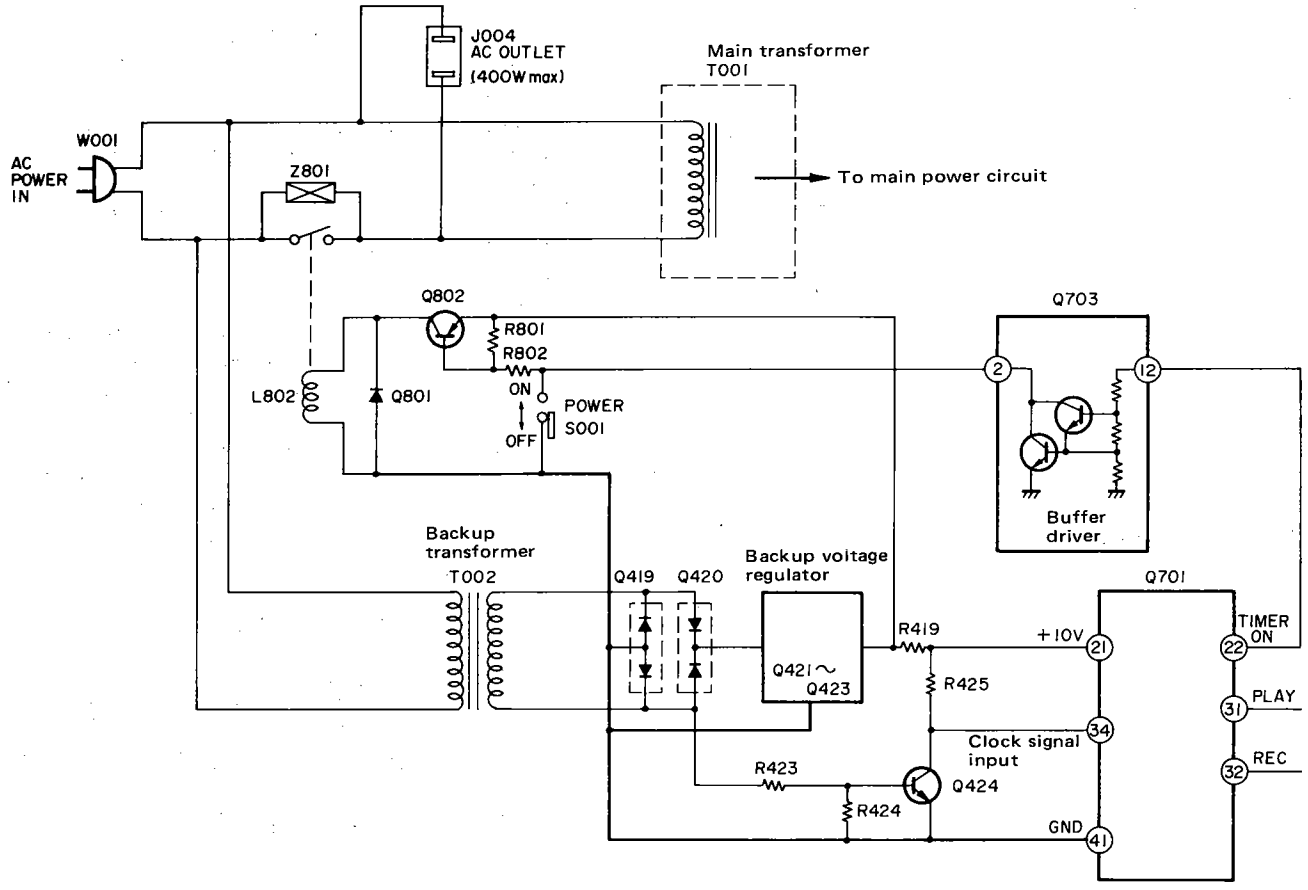
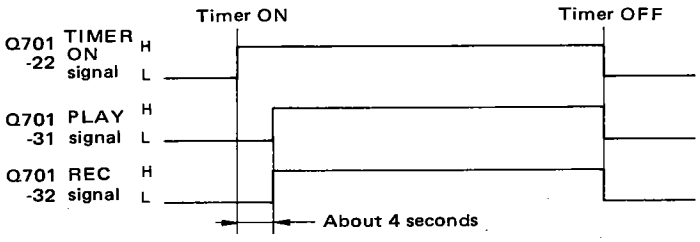
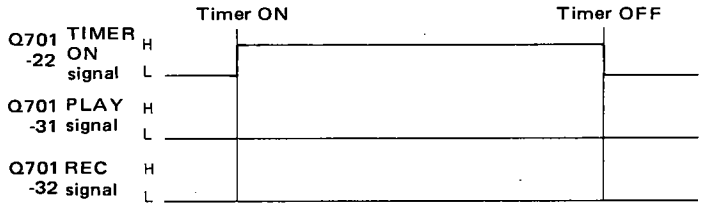


Fig. 5.18 TIMER/REC



a. Fig. 5.18 through Fig. 5.20 shows the output of the microcomputer Q701 at the timer-on and -off times.
b. At the timer-on time, the TIMER ON signal level becomes high and then the PLAY signal level about 4 seconds later.
c. When the POWER switch is OFF, the TIMER ON signal drives Q802 and relay L802 via Q703 and R802.
d. When the contacts of L802 are closed, the AC power is supplied to main transformer T001 and AC outlet J004.
e. AC power is supplied to the external devices through the AC outlet rated at a max. load of 400W.
f. The AC power is supplied to the main power circuit through the main transformer. This circuit is used to drive the capstan motor, solenoids and amplifier. When L802 is activated, the capstan motor starts running and the amplifier is set to the stand-by mode. The motor speed and the voltages at all points are stabilized after about 4 seconds, then the PLAY signal (and REC signal) are output from the microcomputer so that the tape deck is set to the PLAY mode (or REC/PLAY mode).

Fig. 5.19 TIMER/OFF



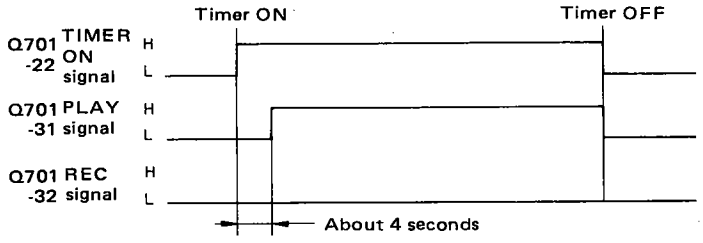
g. At the timer-off time, the levels of the TIMER ON and PLAY signals become low and the tape deck stops. With the TIMER ON signal at low level, Q802 and L802 are turned off and the AC power to the external devices (AC outlet) is turned off.
h. When the TIMER switch is in the OFF position, only the TIMER ON signal is output.
i. When the POWER switch is ON, the AC power is supplied to the main power circuit and the external devices (AC outlet).

Here, the operating modes of the tape deck using the timer and the operating conditions are explained. The terms and conditions used in the explanation are as follows:

Timer ON stand-by . . . Tape deck in any operating condition including STOP is in the stand-by mode until the timer is ON.

Timer OFF stand-by . . Tape deck in any operating condition including STOP is in the stand-by mode until the timer is OFF.

Fig. 5.20 TIMER/PLAY



	Counter Memory	Program Mode	Remarks
Condition 1	OFF	OFF/CA	
Condition 2	PLAY/STOP or PLAY/REPEAT	OFF/CA	Stop/start counts are stored.
Condition 3	OFF	SINGLE or REPEAT	Programs are stored.
Condition 4	PLAY/STOP or PLAY/REPEAT	SINGLE or REPEAT	Count and program are stored.

(5) Timer cycle OFF-ON

The tape deck starts operating at the time preset in the timer. This feature is used when using the deck as an alarm or for unattended tape recording.
(In this case, the timer-off time should be cleared. When the memory is cleared, the display indicates 0:00. The timer-off function does not function at 0:00).

a. When the POWER switch is OFF during timer ON stand-by: At the timer ON time, the power supply of the tape deck is turned on. The external devices are also supplied with AC power.
b. When the POWER switch is ON during timer ON standby:
   AC power is supplied to the tape deck and the external devices.
c. When the TIMER switch is in the REC position:
   At timer ON, the tape deck functions as follows (the parentheses indicate operation when the erasure prevention tabs have been removed from the cassette).

Condition 1:	REC/PLAY (PLAY)
Condition 2:	PLAY (Counter memory and program are not possible.)
Condition 3:	PLAY (PLAY Operations are not possible.)
Condition 4:	PLAY (PLAY) "

d. When the TIMER switch is in the OFF position: The power is controlled by the TIMER ON signal.
e. When the TIMER switch is in the PLAY position: At timer ON, the tape deck functions as follows.

Condition 1:	PLAY
Condition 2:	Counter memory play operation
Condition 3:	Program play operation
Condition 4:	Program play operation

(6) Timer cycle ON-OFF

Set the tape deck to the PLAY or REC/PLAY mode. The tape deck stops at the preset time. This feature is also used for sleep timer operation.
At timer OFF, the tape deck stops. The tape deck also stops if the tape reaches its end before the timer OFF time. To turn off the AC power at the timer OFF time, proceed as follows:

a. Turn the POWER switch ON.
b. Store the timer OFF time, then press the TIMER key to start the timer.
c. Set the deck to the REC/PLAY mode.
d. At timer ON, the deck is set to the PLAY or REC/PLAY mode. Turn the POWER switch OFF.
e. At timer OFF, the tape stops and, at the same time, the AC power to the tape deck and the external devices is turned off.

(7) Timer cycle OFF-ON-OFF

At timer ON, the tape deck is set to the PLAY or REC/PLAY mode; at the timer OFF, the tape deck stops. This feature is also used when using the deck as an alarm or for unattended tape recording. In this case, the timer OFF function is added to the timer cycle OFF-ON in the above item (5). The tape deck stops when the tape reaches its end before the timer OFF time.
If the POWER switch is OFF, the power remains on until the timer OFF time is reached even when the tape stops automatically at the end of the tape.
Note that the timer OFF time should be set to a time later than the timer ON time.

(8) Timer cycle ON-OFF-ON

If the tape deck is in the PLAY or REC/PLAY mode, it will stop at the timer OFF time, and start again at the timer ON time. This feature is also used for sleep timer operation or when used as an alarm. The timer ON time should be set to a time later the timer OFF time. If it is not required to interlock the timer with the power supply, leave the POWER switch in the ON position with the tape deck started, then set the timer OFF and ON times so that the timer operation command is given by the TIMER key.
To interlock the timer with the power supply, use the following procedure:

a. Turn the POWER switch ON.
b. Store the timer ON and OFF times, then press the TIMER key.
c. Set the tape in the PLAY or REC/PLAY mode.
d. Turn the POWER switch OFF.

(9) Timer setting (special case)

When the hour display is other than 1 through 12, an error signal is generated as noted in section 5.3 "CLOCK SET".
However, the clock can be set to 0:00 only in the following cases.

* The power is connected to the tape deck and the CE/RESET key is pressed after the POWER switch is set to ON.
* At the CLOCK SET position of the SELECTOR switch, the CE/RESET key is pressed after the PM key has been pressed.

In either case, the clock starts operating when the CE/RESET key is pressed. Therefore, the timer ON and OFF times can be set using the time when the CE/RESET key is pressed as a reference. In this case, the setting time should be between 1:00 and 11:59, 12:00 PM and 11:59 PM, or 12:00 and 12:59.

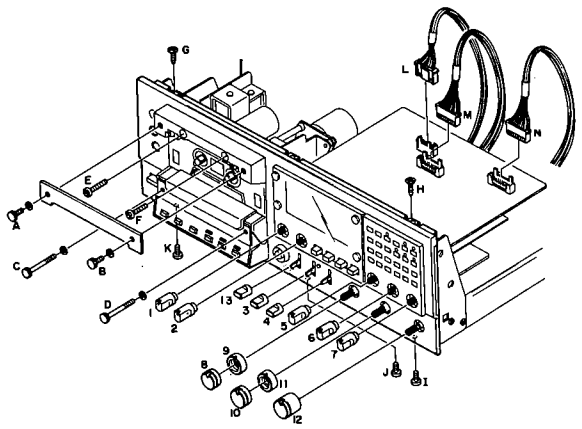
(10) Others

a. When the time on the clock coincides with the timer ON or OFF time during timer operation, the TIMER ON signal is switched momentarily from low level to high level, or vice versa. For example, if 9:05 is stored in memory and the time on the clock advances to 9:05, the TIMER ON signal is given momentarily. In this case, the TIMER ON signal remains the same even if 9:05 is stored in memory when the clock indicates 9:05.
b. When the tape deck is in the PLAY or REC/PLAY mode during timer operation, the operating mode remains unchanged even if the TIMER switch is set to another position.

4. DISASSEMBLE

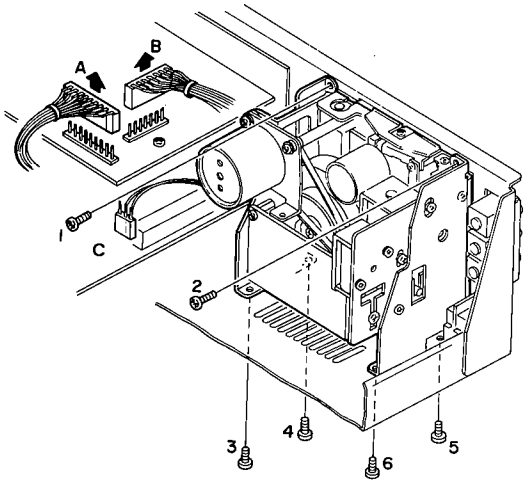
1. Removing the Front Panel

Remove the 13 knobs 1 ~ 12 and 13. Then, remove the 10 screws A, B, C, E, F, G, H, I, J and K.
Then, remove the two connector L, M.



2. Removing the Mechanism Chassis

1) Remove the mechanism operating section housing. (Refer to detaching the front panel.)
2) Remove the 6 mechanism mounting screws.
3) Remove connectors (A), (B) and (C).

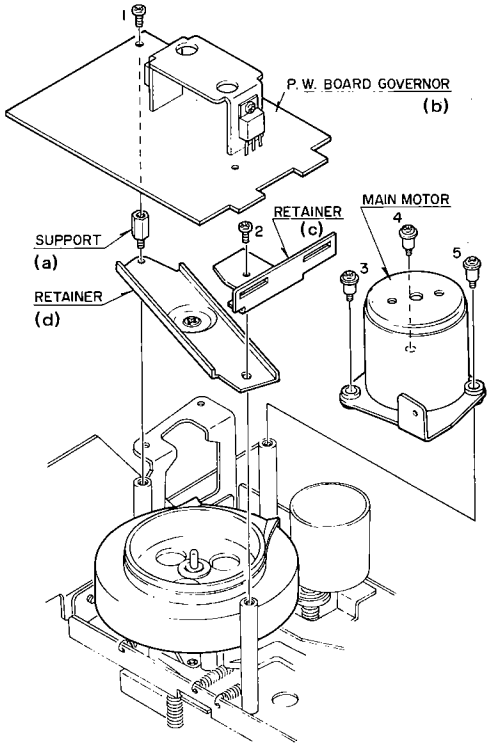


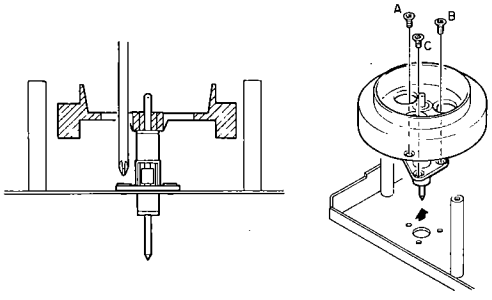
3. Detaching the Flywheel

1. Remove the single mounting screw (1) of the printed wiring board (b).
2. The printed wiring board can now be detached.
3. Remove the support (a) and the single attaching retainer (c) mounting screw (2).
4. The flywheel support retainer (d) can now be detached.
5. Remove the motor mounting bracket (3 screws).

NOTE: Take care to avoid oil getting on the motor belt.

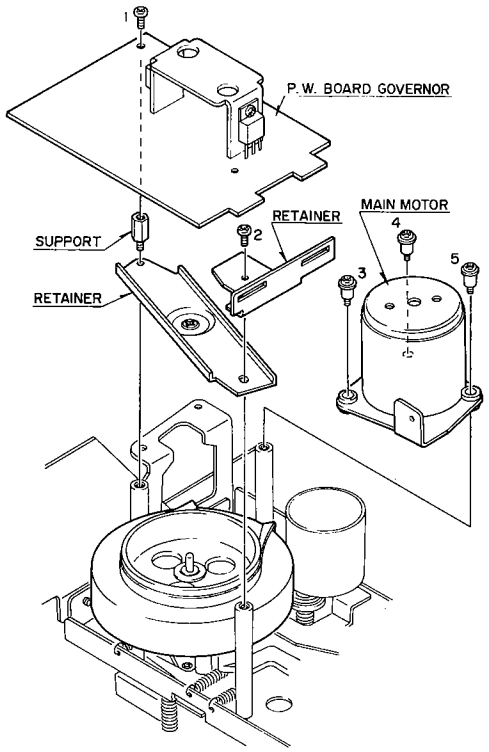
6. Insert a screwdriver through the 3 holes in the flywheel.
7. Remove the 3 spindle bearing mounting screws (A), (B), (C).
8. The flywheel can be detached.

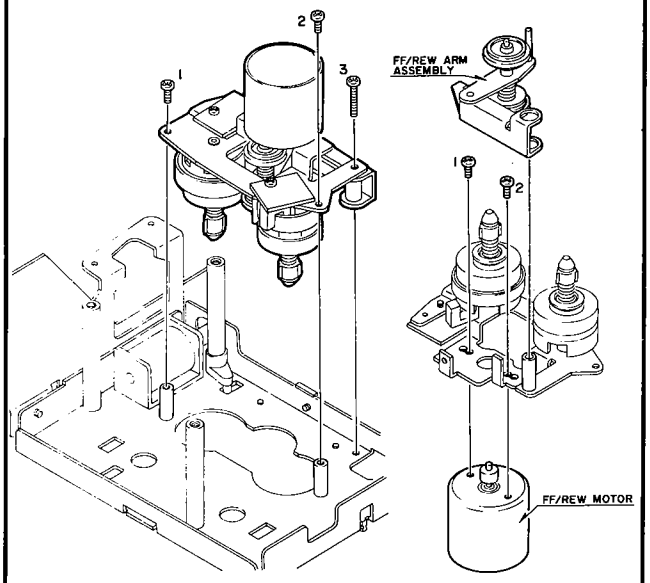




4. Detaching the FF/REW Motor

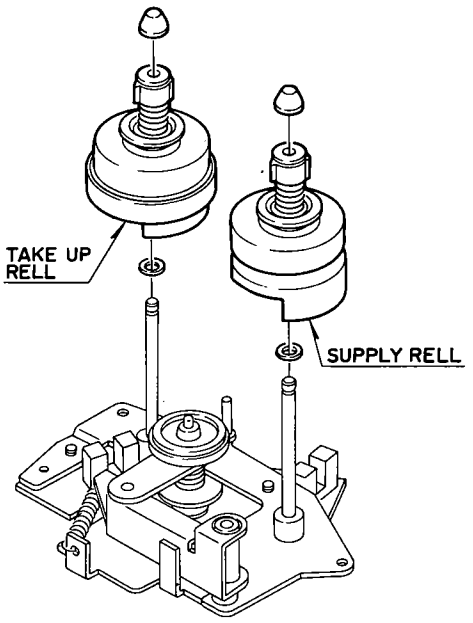
1. Remove the mechanism block.
2. Remove the solenoid mounting bracket.
3. Remove the main motor mounting bracket.
4. Remove the flywheel (For flywheel detaching procedures, refer to paragraph 9 on Page 29).
5. Remove the 3 FF/REW motor mounting screws, (1), (2), and (3).
6. Remove the 2 mounting screws, (1) and (2), for the motor mounted on the motor mounting bracket.





5. Detaching the Supply and Tape-up Real Disk

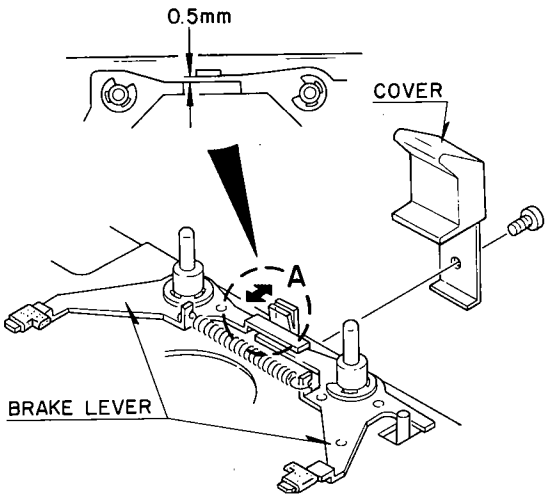
1. Remove the caps A holding the reel disks in place.
2. Release the brake lever and remove the reel disks.



5. MECHANICAL ADJUSTMENT

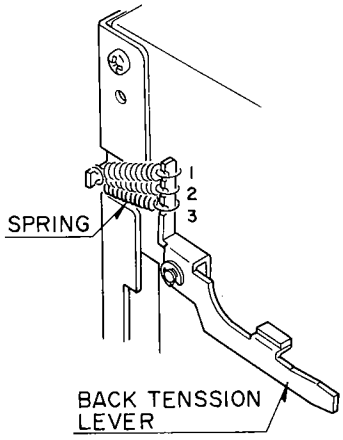
1. Brake Timing Adjustments

1. Remove the cover.
2. Adjust by bending portion (A) of the brake lever (076N) so that brake timings of the supply and take-up sides coincide with each other.
3. Set brake lever clearances to approximately 0.5 mm on both the supply and take-up sides.



2. Back Tension Adjustments

1. Alter the spring location, (1), (2), or (3), so that the back tension is between 3.5g and 6g.



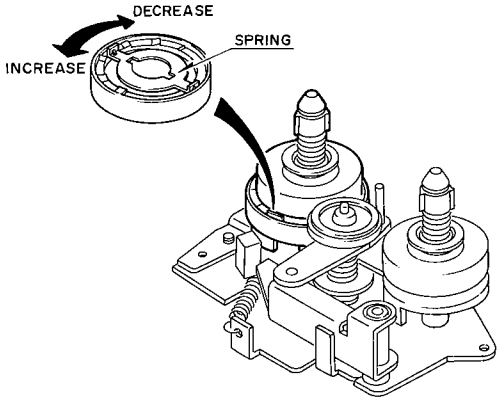
3. Play Torque Adjustment

Put the two pawls of the circular plate spring on proper stepped position of the reel rest. The adjustable torque range is 40 to 70 g-cm.

To make the torque high, put the pawls on a shallow step. For lower torque, put them on a deeper step.

Torque can be adjusted by shifting position of the spring P/N 4397115040.

The torque ranges from 40 to 70 g-cm.



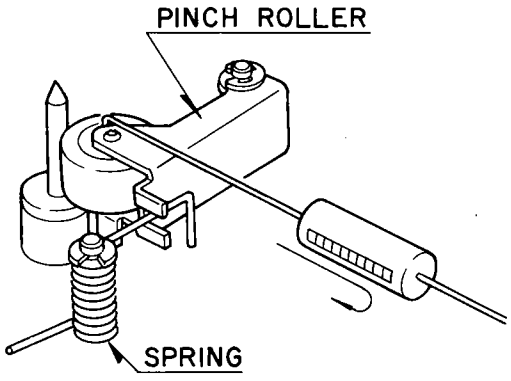
4. FF and REW Torques are not Adjustable

* If FF or REW functions are inadequate, renew the entire block, P/N 4397002420.
* When the motor (Reel motor M002) is worn, FF and REW modes may not function properly. In such a case, renew the motor.

5. Pinch Roller Pressure

360g ± 50g

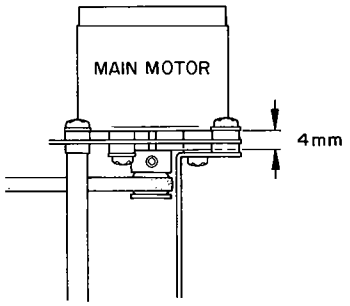
Measure the pressure of the pinch roller using a gauge as shown. For measurement, draw the pinch roller in the arrow direction in which it is detached from the capstan shaft and gradually return it toward the capstan. Read the gauge at the time when the pinch roller starts turning. The standard pressure is 360g ± 50g.



6. Motor Pulley Adjustments

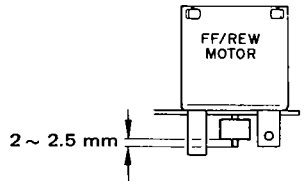
Loosen the set screw and adjust the motor pulley position until the clearance between the pulley and motor is 4 mm as shown. Tighten the set screw.

* Main Motor



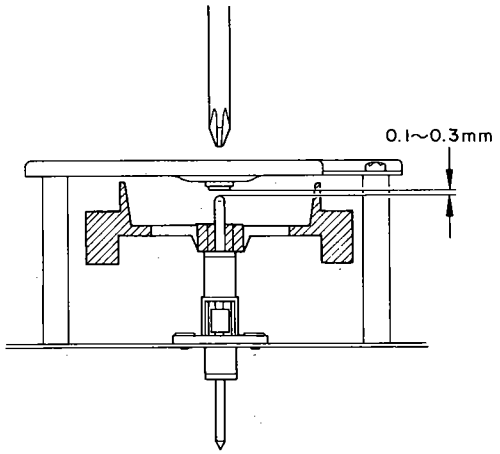
* FF/REW Motor

Insert the pulley so that the distance between the motor shaft and the pulley is 2 mm ~ 2.5 mm.



7. Flywheel Thrust

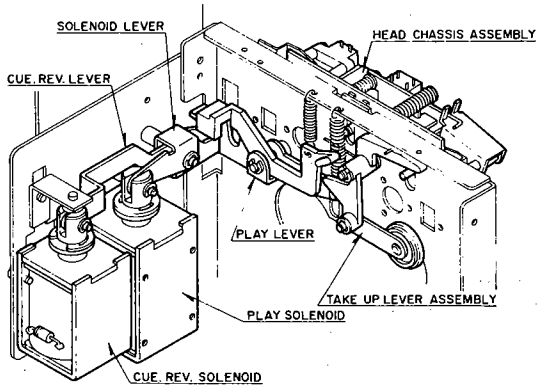
Adjust the thrust screw at the flywheel bracket until the clearance between the capstan tail end and thrust bearing is 0.1 to 0.3 mm as shown, using a Phillips screw driver. For adjusting, feel of axial dropping of the flywheel for proper clearance as this cannot been seen through. Then paint the screw to lock.

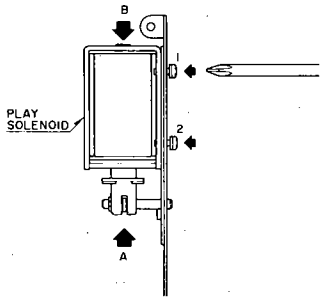


8. Solenoid Adjustments

* Main Solenoid

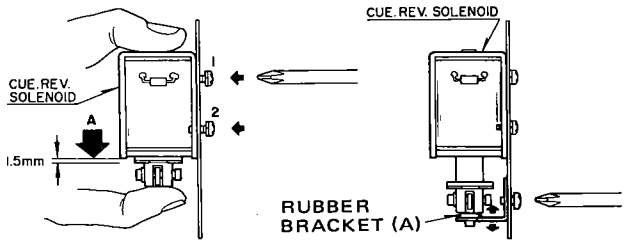
1. Loosen the two Solenoid mounting screws.
2. Push the Solenoid plunger all the way with fingers in the direction of arrow (A). At this point, the head chassis should be in direct contact with the tape-up and supply reel sides.
3. Maintaining this condition, tighten Solenoid mounting screws, (1) and (2). At this time, push the Solenoid lightly to the plunger side in the direction of arrow(B).





* Cue/REW Solenoid

1. Move the head chassis by 1.5 mm from the extreme location where it was pushed.
2. Fasten the Solenoid in this new location. (However, the plunger should remain pushed as far in as possible.)
3. Fasten the mounting rubber bracket (A) so that the plunger touches the rubber when the head chassis moves back all the way.



6. ELECTRICAL ADJUSTMENT

Precautions before Adjustment

1. Before playing the test tape back, thoroughly demagnetize the heads, capstan and similar metal parts using an eraser as the test tape-recorded tone is easily erased.
2. Do not place the test tape on any measuring instrument.
3. Do not put the test tape near a place where the eraser is used.
4. Method of Demagnetization: — Turn the eraser power switch on at a remote position far away from the heads. Bring the eraser close to the heads, capstan and other parts to be demagnetized, and move it up and down four or five times to demagnetize. Slowly separate the eraser far away from the parts, and turn the power switch off.
5. Do not use any magnetized adjusting tool. When using it, demagnetize it from time to time in the course of each adjustment.
6. Do not turn semi-fixed resistor more than needed.
7. Do not apply locking bond excessively.

Definitions

1. The "normal playback state" is an operating state of the tape deck which plays back the MTT-150 test tape and is adjusted so as to produce a 580 mV output at the LINE OUTPUT terminal with the load assuming the measuring instrument input impedance of greater than 100 kΩ and with the TAPE SELECTOR switch set at the NORMAL position.
2. The "normal recording state" is an operating state of the tape deck which records a 1 kHz signal to a specified recording level for which the recording level control is adjusted with the 1 kHz signal applied at a specified input level to the MIC terminal.
   In the normal recording state, therefore, this tape deck is set up with the level control to the state that the Peak Level Displays may illuminate to the 0 VU with a 1 kHz, 1 mV input signal applied.

1. Head Azimuth Adjustment

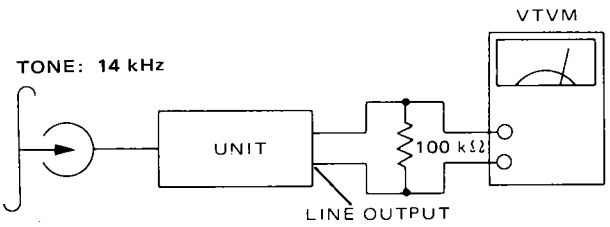
SETUP

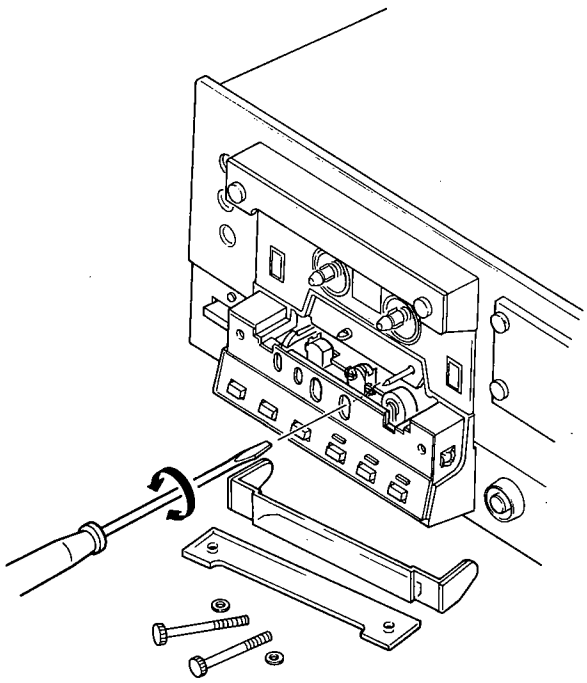
1. Power voltage: — 50 or 60 Hz AC voltage rated for the unit to be used in a market country.
2. TAPE SELECTOR switch position: — NORMAL.
3. Load: — Measuring instrument input impedance.
4. Output terminal used: — LINE OUTPUT.
5. Test tape used: — MTT-216.
6. Tape speed selector switch: — STANDARD.

PROCEDURES

1. Play the 14 kHz portion of the test tape MTT-216 back. Adjust the head azimuth adjusting screw for maximum VTVM read.
2. If the peak output reads of the right and left channels are different, set the screws to obtain the mechanical center between the peaks.
3. After adjustment, lock the screw with bond.

Mode: Playback





CAUTION

After adjustment, repeat the playback and stop setting a few times to make certain of no head azimuth deviation.

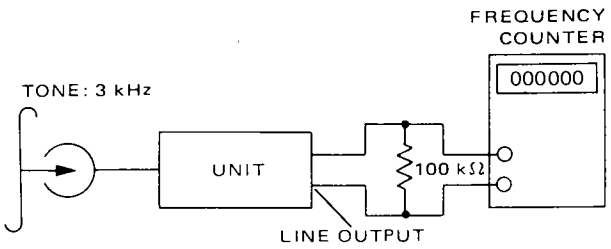
2. Tape Speed Adjustment

SETUP

1. Power voltage:— 50 or 60 Hz AC voltage rated for the unit to be used in a market country.
2. Output terminal:— LINE OUTPUT (or DIN).
3. Test tape used:— MTT-111 (3 kHz Tone) at 1-7/8 ISP.
   MTT-111SP at 3-3/4 IPS.
4. Unit position:— Vertical.
5. Tape speed selector switch: — STANDARD or HIGH.

PROCEDURES

1. For 1-7/8 ips, play the mid portion of the test tape MTT-111 back. Adjust the tape speed adjusting variable resistor inside the motor for 2990 to 3010 Hz counter indication.
2. For 3-3/4 ips, play the mid portion of the test tape MTT-111 back. Adjust R327 for 5990 to 6010 Hz counter indication.



CAUTIONS

1. The tape deck should be set up in the normal operating condition.
2. Do not turn the variable resistor more than needed.
3. Do not proceed with adjustment after the tape deck terminature has changed.
4. If a strong shock or vibration is applied to the tape deck after adjustment, make certain that the measured tape speed had not changed.
5. If the tape speed deviation occurs, perform the adjustment again.
6. The counter may indicate a wrong value because of too low counter input level.
7. Before adjustment, allow for 30 seconds or more after depressing of the PLAY pushbutton.

NOTE: Be sure to carry out the 1-7/8 ips tape speed adjustment first.

3. Playback Equalizer Adjustment

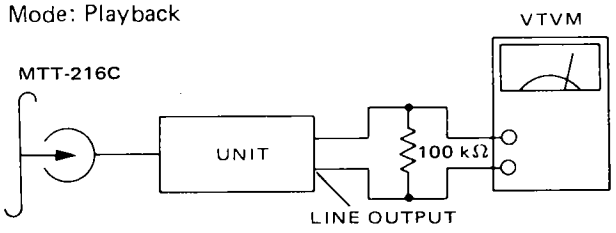
SETUP

1. Power voltage:— 50 or 60 Hz AC voltage rated for the unit to be used in a market country.
2. TAPE SELECTOR switch position:— NORMAL.
3. Load:— Measuring instrument input impedance.
4. Output terminal:— LINE OUTPUT.
5. Test tape used:— MTT-216.
6. Tape speed selector switch: — STANDARD.

PROCEDURES

1. Play the test tape MTT-216. Let the 315 Hz signal level be reference as 0 dB.
2. Adjust R168 and R268 (5 kΩ each) for 10 kHz frequency response of 0 to −1 dB in reference to the 315 Hz signal level.

NOTE: 1. Proceed both for the right and left channels in the same manner.
2. Note that clockwise turning of R168 and R268 will increase the 10 kHz signal output level. (In case of Adjusting from the solder side)

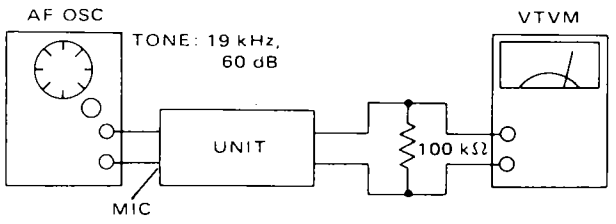


4. LED Meter Adjustment

Tape Selector switch — NORMAL position.

PROCEDURES

1. Apply a 1 kHz −60 dB signal from the mic.
2. Switch the Monitor switch to souse.
3. Adjust the mic volume to provide 3V DC at J601 (L ch.). (J621 for R ch.).
4. Adjust resistor trimmer R602 (R622 for R ch.) so that the "0" LED lights.
5. Adjust the mic volume to provide 580 mV (AC) at J107 (L ch.) J207 (R ch.).
6. Adjust R610 resistor trimmer (R630 for R ch.) so that the "+2 " LED lights.



5. Playback Output Adjustment

SETUP

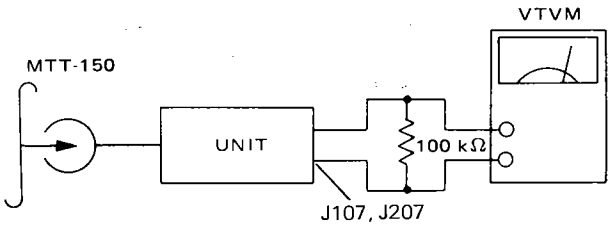
1. Power voltage:— 50 or 60 Hz AC voltage rated for the unit to be used in a market country.
2. Tape selector switch position: — NORMAL.
3. Load:— Measuring instrument input impedance.
4. Output terminal:— J107, J207.
5. Test tape used:— MTT-150.
6. Tape speed selector switch: — STANDARD.

PROCEDURES

Play the test tape MTT-150 back. Adjust R176 and R276 (50 kΩ each) for 580 mV playback output level.

NOTE: Proceed both for the right and left channels in the same manner.

Mode: Playback



CAUTION

- This adjustment should be performed after the one for the playback equalizer. If the playback equalizer is adjusted after the playback output adjustment, the playback output should be readjusted.

6. Recording Current Adjustment

SETUP

1. Power voltage 50/60 Hz AC rated for the unit in the destination country.
2. Input signal:-1 kHz — 60 kB Mic Input
3. Output terminals: . . . . . LINE OUT
4. Tape selector switch position: - NORMAL, SPECIAL/CrO_2, Fe-Cr, or Metal
5. Tape speed selector:- STANDARD or HIGH
6. Load:- Measuring instrument input impedance

PROCEDURE

1. In Rec mode, adjust the mic volume to 0 VU. Line Out output at this time is reference level 0 dB.
2. Adjust trimmers to provide a 0 dB output level when tape is recorded and played back.
   STANDARD speed R124 (L ch.) R224 (R ch.)
   HIGH speed R123 (L ch.) R223 (R ch.)

7. Recording Bias Current Adjustment (Temporal)

SETUP

1. Power voltage:— 50 Hz/60 Hz AC voltage rated for the unit to be used in a market country.
2. Tape speed selector switch: — STANDARD.
3. Output terminal: — J414, L ch, J435, R ch
4. Load:— Measuring instrument input impedance.

PROCEDURES

1. Select Rec-Pause mode.
2. Connect a VTVM J414 (Hot) J444 (GND) L ch. across J435 (Hot) J445 (GND) R ch.
3. Adjust trimmers to provide the following indications on the VTVM:
   (1) Tape Selector in NORMAL position:
   Adjust R410 (L ch.) and R411 (R ch.) to provide 1 mV. (P400)
   (2) Tape Selector in SPECIAL/CrO_2 psition:
   Adjust R314 (common for L and R) to provide 1.5 mV. (PK11)
   (3) Tape Selector in Fe-Cr position:
   Adjust R316 (Common for L and R) to provide 1.1 mV. (PK11)
   (4) Tape Selector in METAL position:
   Adjust R318 (common for L and R) to provide 2.7 mV. (PK11)

NOTE: 1. Adjust (1) NORMAL position first. If after adjusting other positions R410 or R411 are altered so readjust for all the other positions.

2. The above adjustments are tentative. Finally, adjustments to provide Rec-Playback frequency characteristics failling within specified ranges are necessary.

8. Recording Equalizer Adjustment

SETUP

1. Power voltage:— 50 Hz/60 Hz AC voltage rated for the unitto be used in a market country.
2. Input level:— —20 dB lower than —60 dB.
3. Tape selector switch: — NORMAL.
4. Output terminal:— L ch. J414 (Hot), J444 (GND)
   R ch. J435 (Hot), J445 (GND)

PROCEDURES

1. Stop the recording bias current oscillator. Cutting out the bias circuit.
2. Set up the unit to the normal recording state. Reduce the input level by 20 dB.
3. Set the Tape selector switch to the Normal position. Set the audio-frequency osocillator to 15 kHz. Connect the VTVM L ch. J414 (Hot), J444 (GND), R ch. J435 (Hot), J445 (GND). Adjust L102 and L202 for maximum VTVM read. Tape speed selector switch — (Standard speed).
4. In turn, set the Tape selector switch to NORMAL position. Set the audio-frequency oscillator to 22 kHz. Connect the VTVM L ch. J414 (Hot,) J444 (GND), R ch. J435 (Hot), J445 (GND). Adjust L103 and L203 for maximum VTVM read. Tape speed selector switch — (High speed).
5. After adjustment, release the recording bias.

CAUTION

The adjusting rod should be non-metalic.

9. Record-Playback Frequency Response Adjustment

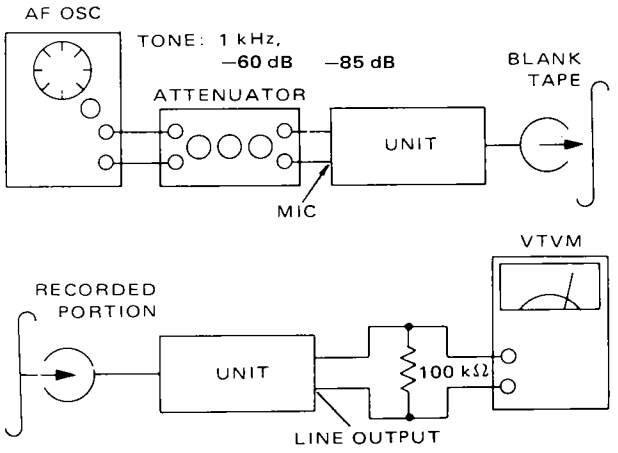
SETUP

1. Power voltage:— 50 Hz/60 Hz AC voltage rated for the unit to be used in a market country.
2. Tape selector switch: — NORMAL.
   Tape speed selector switch: — STANDARD & HIGH.
3. Input signal:— 1 kHz, —60 dB with —23 dB referenced as 0 dB.
4. Output terminal:— Line out.
5. Load: Measuring instrument input impedance.
6. Playback output level:— Same as the recorded signal level.
7. Blank tape used:— AC-211, AC-511, CS-30 & AC-701.

PROCEDURES

1. Connect the input signal to the MIC terminal. Set up the unit to the normal recording state.
2. In turn, reduce the input level by —23 dB (25 dB down from Dolby Level) with the use of the attenuator. Record the 1 kHz and 10 kHz tones.
3. Play the 1 kHz 23 dB down recorded tone back as 0 dB. Adjust the recording bias current until the 10 kHz response is within ±0.5 dB as referenced to the 1 kHz, 0 dB response.
4. Follow similar sequence for the other Tape Selector switch positions (Fe-Cr, CrO_2, and Metal) and adjust the bias current so the frequency response falls within the specified range.
5. When the tape speed is High, adjust Rec. EQ for all the Tape Selector switch positions to provide response within specifications.
6. Proceed both for the right and left channels in the same manner.
7. If the recording current is recorded reduced in the above adjustment, be sure to measure the distortion.

Mode: Record



Record/Play Back Frequency Response Adjustment

Tape	Standard		High	
	EQ	Bias	EQ	Bias
Normal	○	⊗	○	—
Fe Cr	fix	◎	fix	—
CrO_2	fix	◎	fix	—
Metal	fix	◎	fix	—

1. Columns marked ○, ⊗, and ◎ include adjusting arrangement.
2. ○ Concerning fixed EQ columns, only Normal Tape is marked adjustable but if readjusted for Normal Tape, the other tape positions are also affected.
3. ⊗ includes trimming controls for both L ch. and R ch. (2).
   ◎ includes a trimming control common for L ch. and R ch. (1).

10. 19 kHz Filter Adjustment

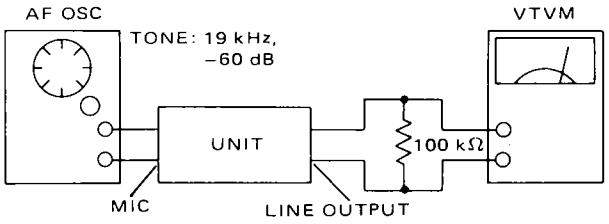
SETUP

1. Power voltage:— 50 Hz/60 Hz AC voltage rated for the unit to be used in a market country.
2. Input terminal:— 19 kHz, —60 dB.
3. Tape selector switch: — NORMAL.
   Output terminal:— Line out.
4. Load:— Measuring instrument input impedance.

PROCEDURES

1. Connect the 19 kHz, —60 dB input signal to the Mic Input terminal. Adjust the level control for 0 VU.
2. In turn, MPX Filter switch to the ON position. Adjust the L101 and L201 for minimum output level at the Line Out.
3. Proceed both for the right and left channels in the same manner.

Mode: Record



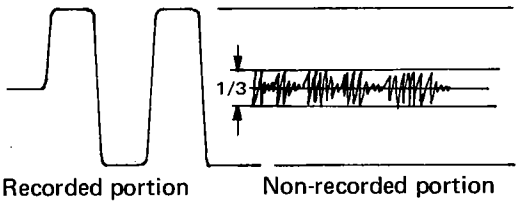
11. Program Selection by Inter-program gaps — Function Adjustments

SETUP

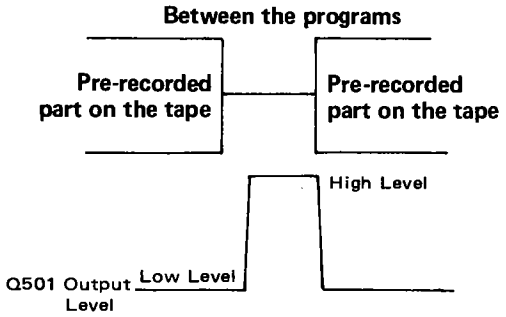
1. Tape speed selector switch: — NORMAL.
2. Tape selector:— Set to accommodate the music tape used.
2. Tapes to be used:— Should have large level differences between programs and inter-program gaps, and have around 4 second gaps between programs. Pre-recorded popular music tapes, for instance, are adequate.
3. Measurement terminals:— C510 negative side
   Q501 collector

PROCEDURE

1. Connect the Ch. 1 probe of a synchroscope to the Q501 collector.
2. Connect the Ch. 2 probe of the synchroscope to the negative side of C510.
3. Adjust R615 to provide a ratio of 1/3 or less between the noise levels of recorded and non-recorded portions of the tape.



4. Next, adjust R519 as follows:
   * Turn R519 to the extreme counterclockwise.
   * Slowly turning R519 clockwise, watch Q501's collector waveform.
   * Stop turning where, between programs, Q501's collector level becomes "Low".
   * Turn clockwise further by approximately 10° beyond this position.



   * Select the Play-Pause mode.
     At this time make sure that Q501's collector level becomes "High" for 2 to 3 seconds.
   * Next release Pause, and make sure that the collector level becomes "Low" in the recorded portion.

5. When in the Cue mode:
   * Put the microcomputer in the Program Playback mode, such as Program Inputs 2 and 4, for example.
   * Input 2 and 4 and push the Start button.
   * The unit will Rewind and run the tape in the Cue mode for the first program.
   * Make sure that between the first and second programs Q501's collector level becomes "High".
   * If at this time the unit malfunctions, readjust R519. (Readjust so as to lower the overall level.)

NOTE: When R519 is readjusted, make sure performance in the Play mode is natural.

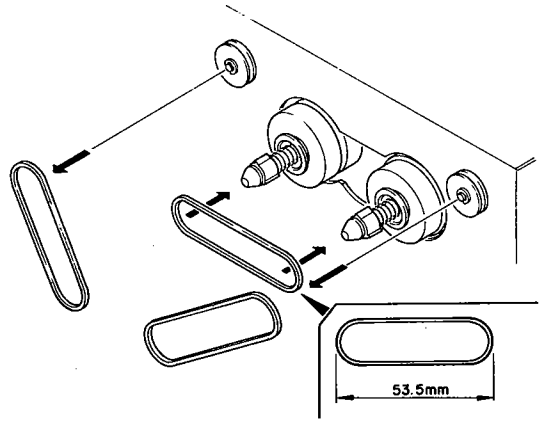
12. Tape Slack Prevention Circuit Adjustments

a. Set the mechanism operation button to STOP.
b. Inserf a torque cassette, or short-circuit J519 and J502. (By shorting circuit, the reels always rotate.)
c. Adjust RM11 so that the torque becomes 35 to 50 g-cm.
d. Remove the shorting wire after adjustment.

NOTE: **This circuit functions only for a second or two after switching the power on. Therefore, the torque cassette procedure should be repeated several times to adjust to the specified torque.**

13. Adjustment of Reel Base Speed in FF/REW mode for Adjustment, Use a Digital Stroboscope

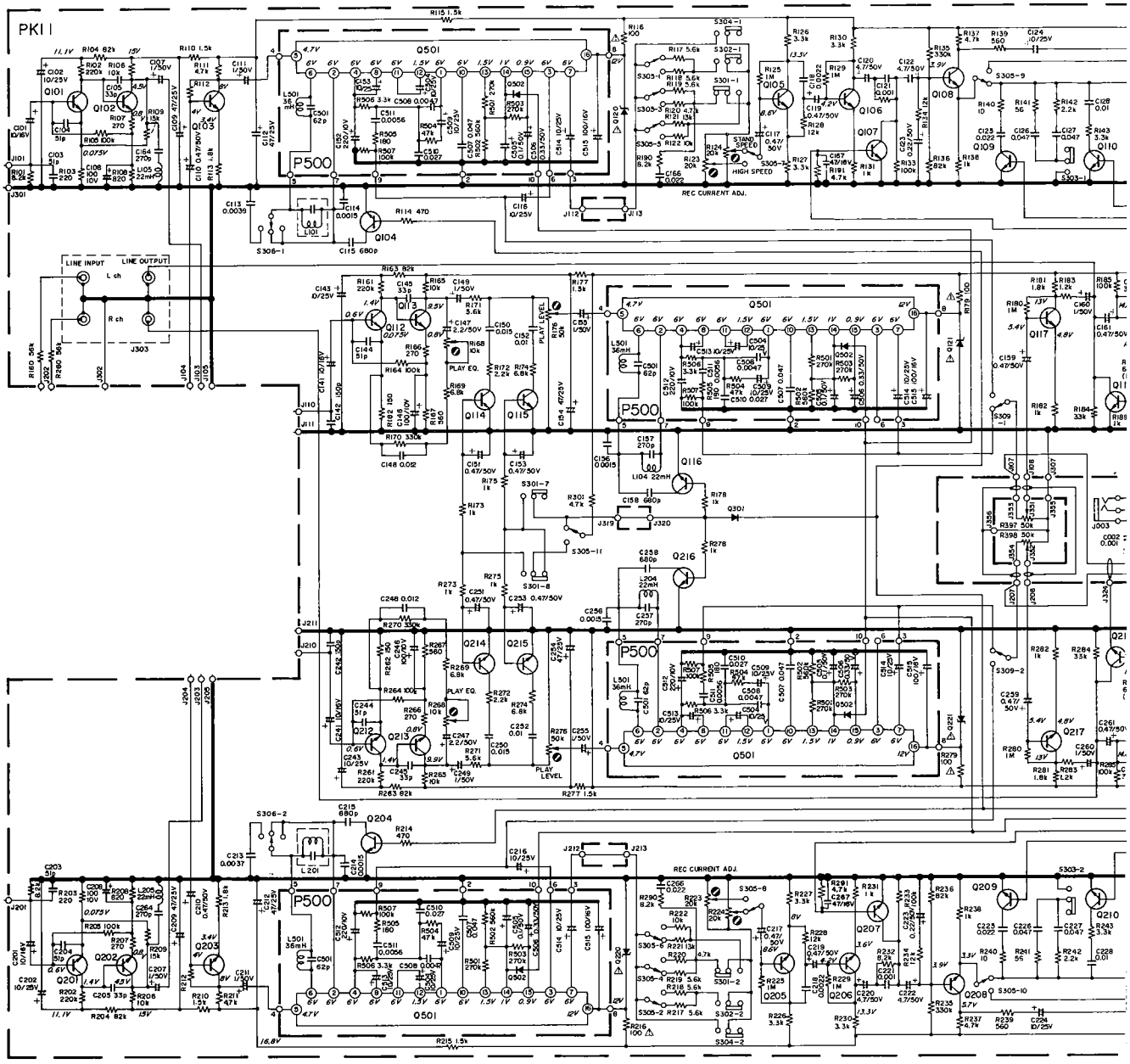
1. a. Set the tape in FF mode.
   b. Adjust RM34 until the speed of the take-up reel base reaches 1070 rpm.
2. a. Adjust so that the speed of the take-up reel base is equal to the speed of the supply reel base.
   Example 1: Use a rubber band as shown below.



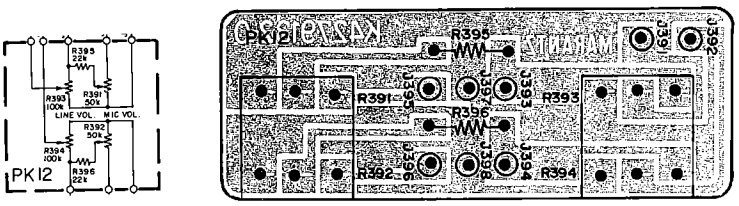
   2: Engage the rubber band with the reel bases as shown in the illustration.
   3: Before engaging the rubber band, remove the mechanism case.
   b. **Set the tape in FF mode.**
   c. **Adjust RM48 until the speed of the tape-up reel base reaches 700 rpm.**

7. DIAGRAM AND COMPONENT LOCATIONS

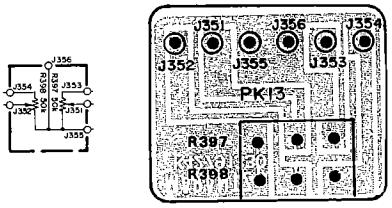
7.1 Pre Amp. Assembly (PK11) Schematic Diagram and Component Locations

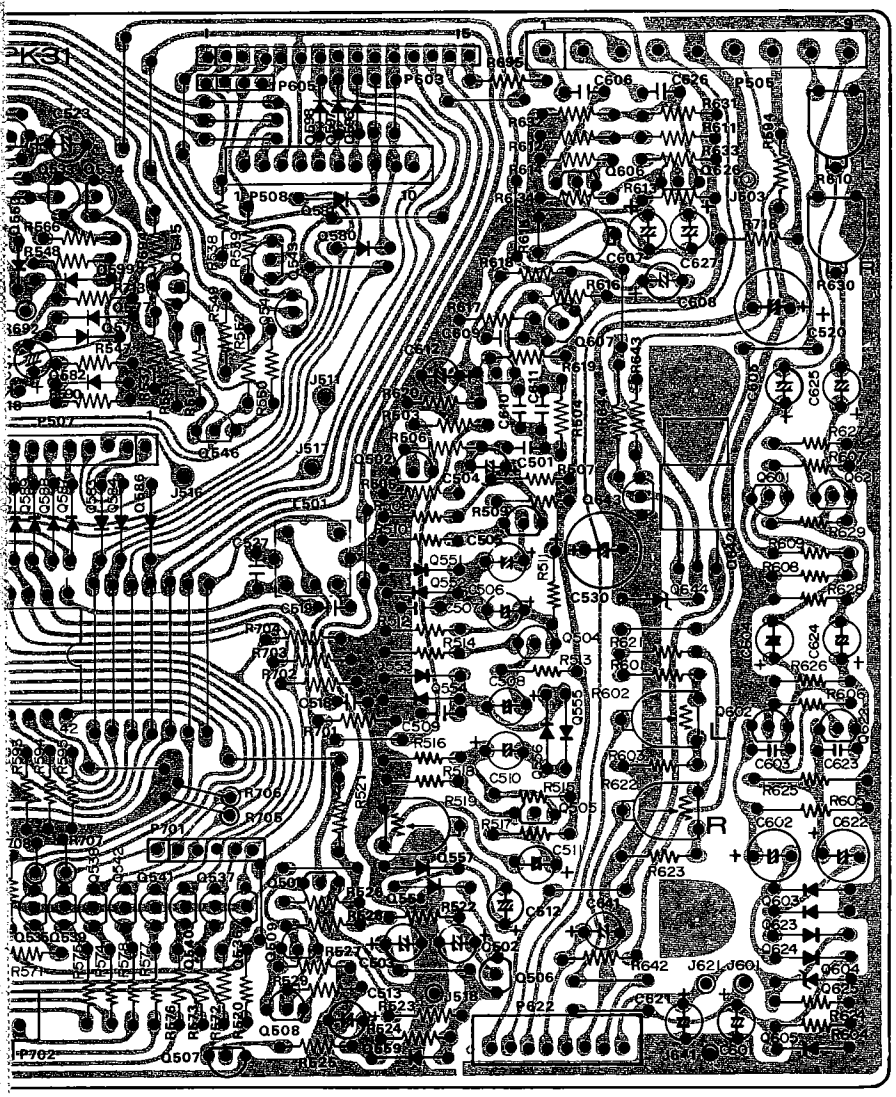


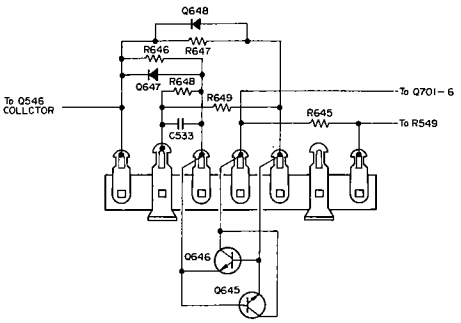
7.2 Mic Line Volume Assembly (PK12) Schematic Diagram and Component Locations



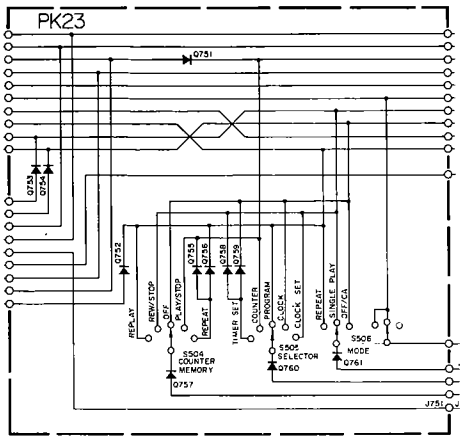
7.3 Output Volume Assembly (PK13) Schematic Diagram and Component Loca

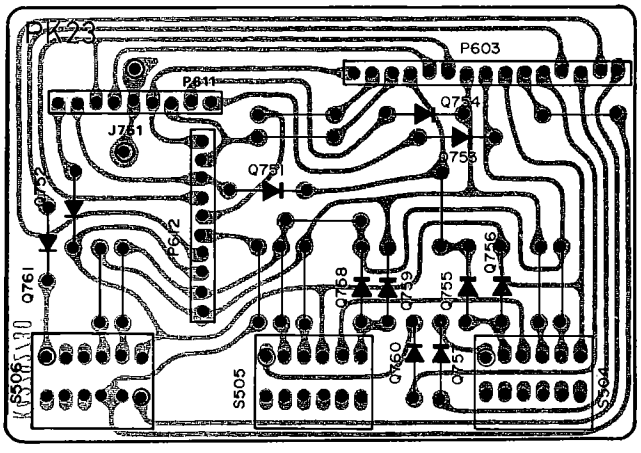


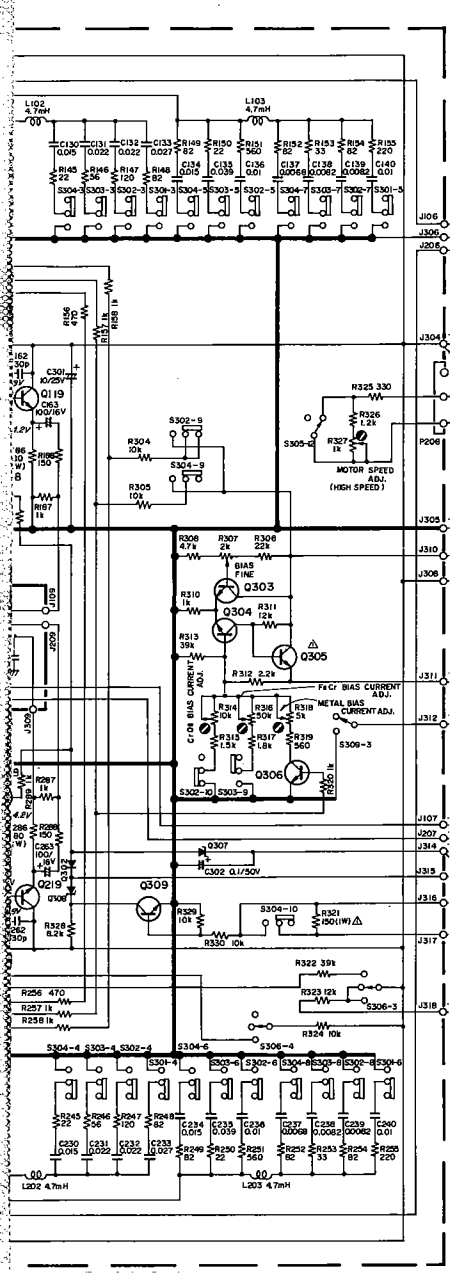




7.5 Program Selector Assembly (PK23) Schematic Diagram and Component Locations







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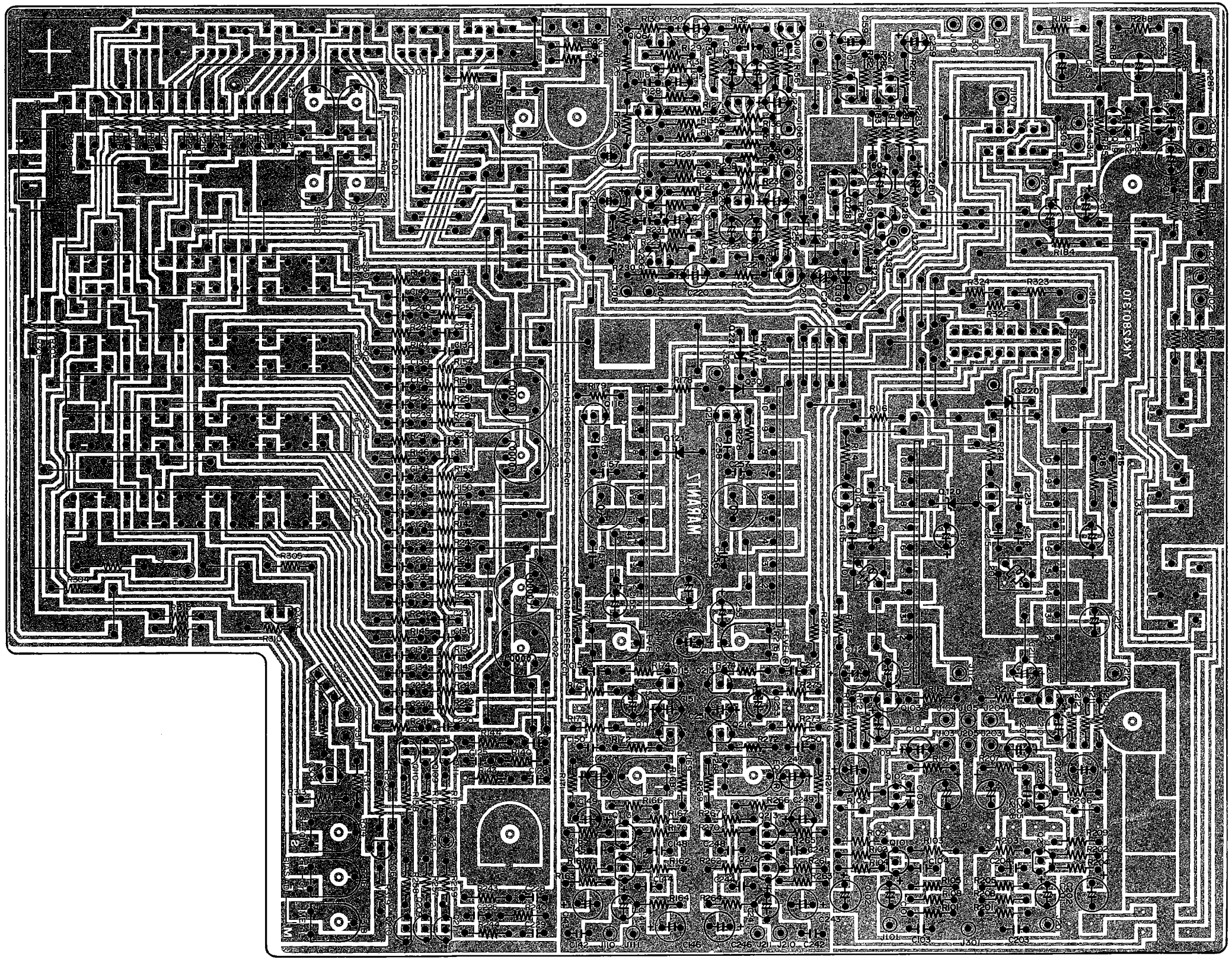
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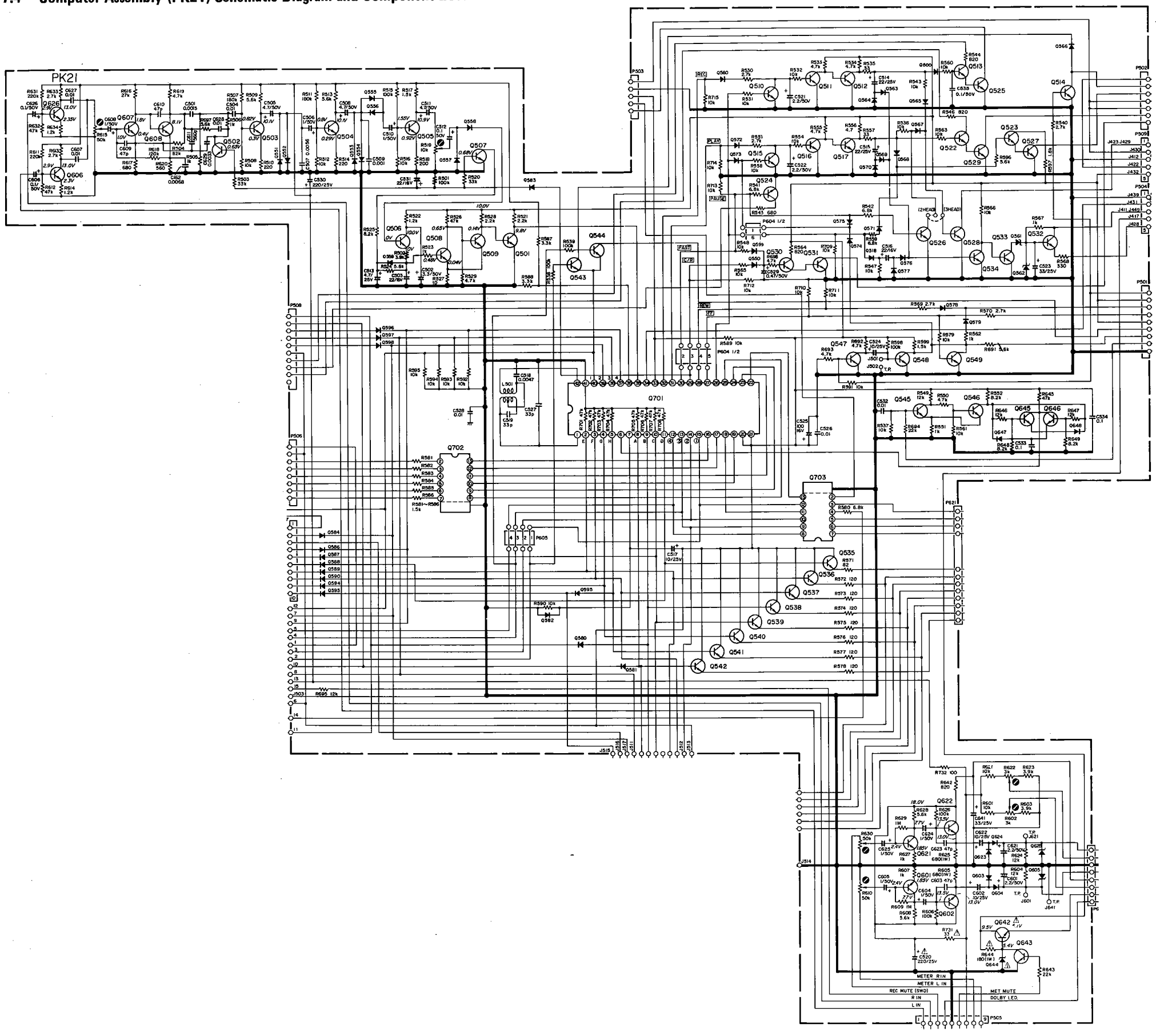
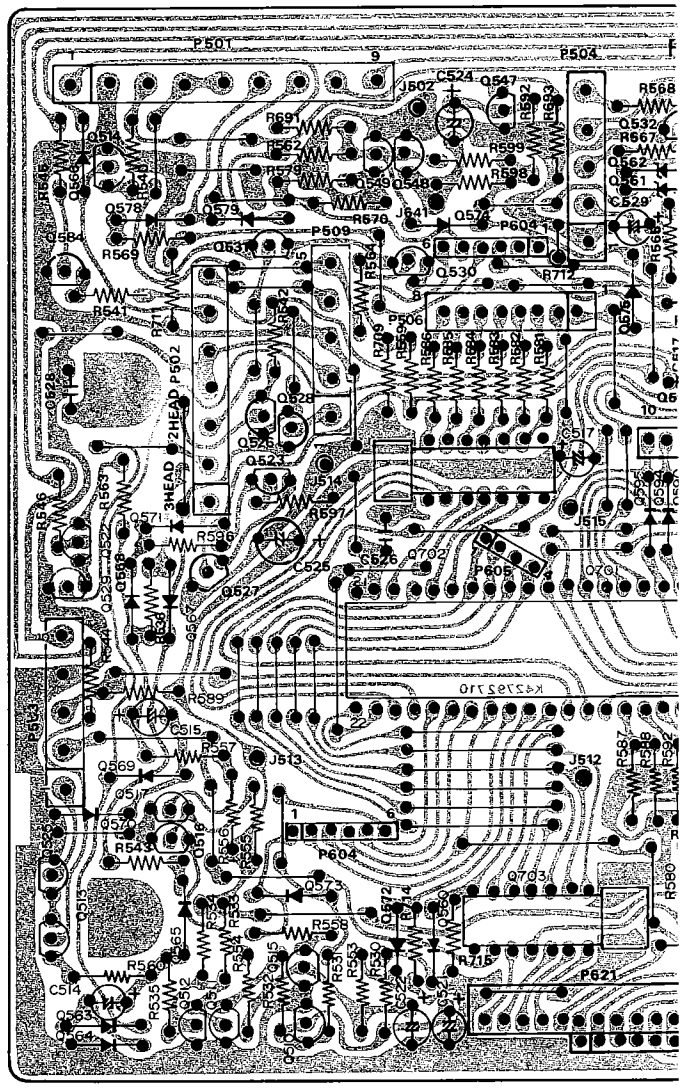
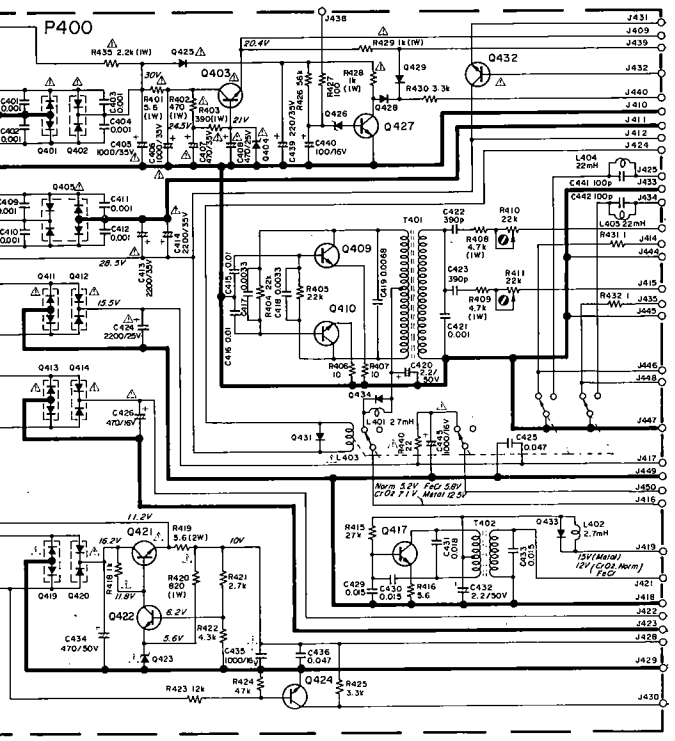
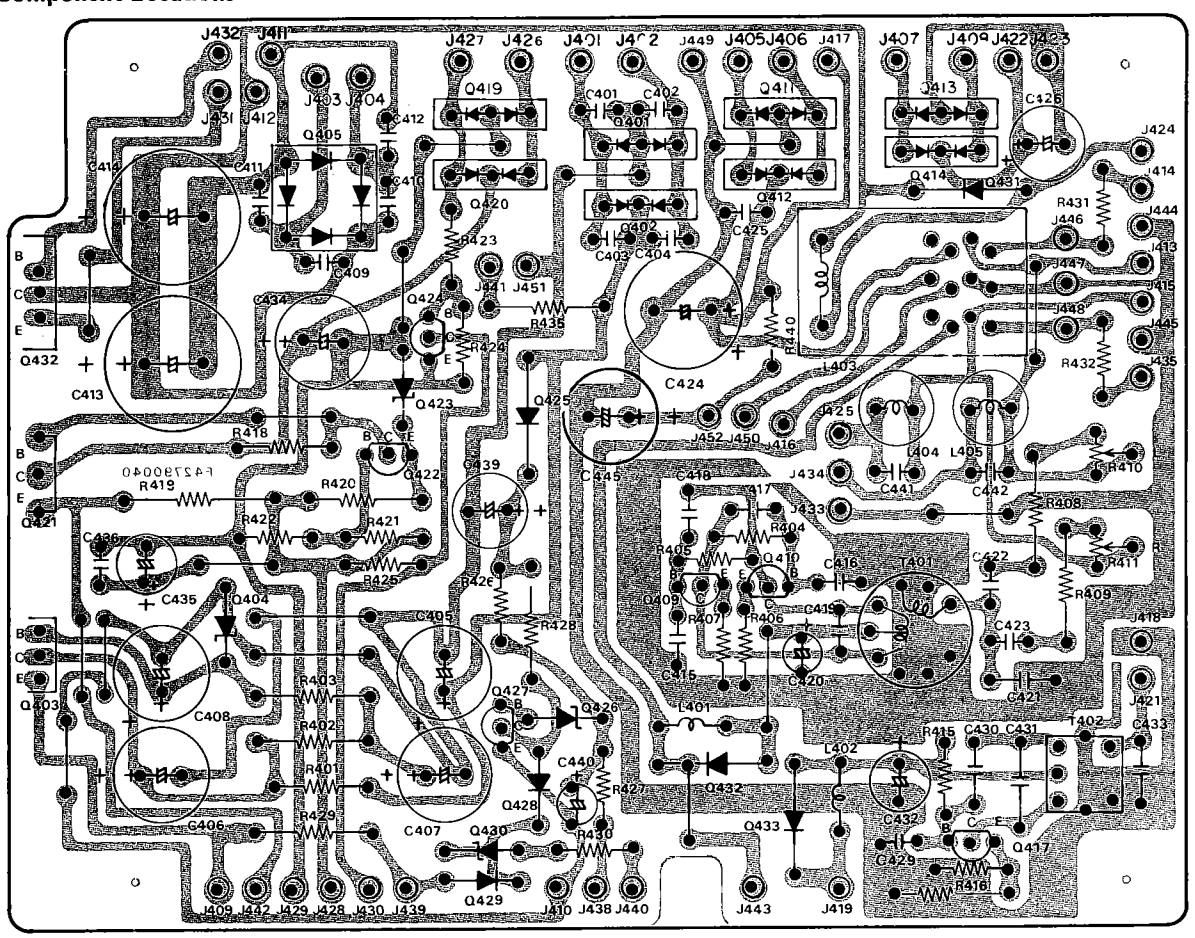
7.4 Computer Assembly (PK21) Schematic Diagram and Component Locations



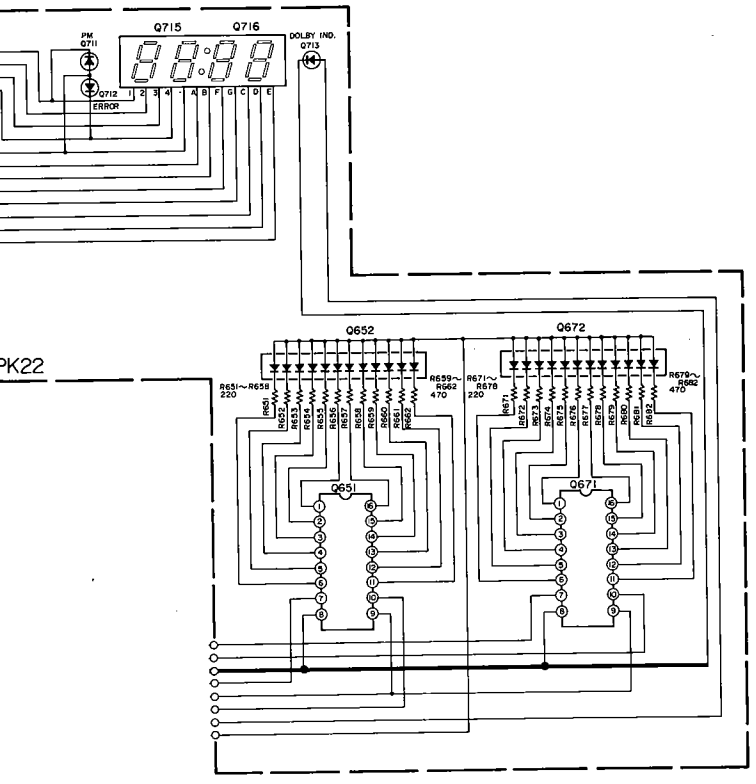


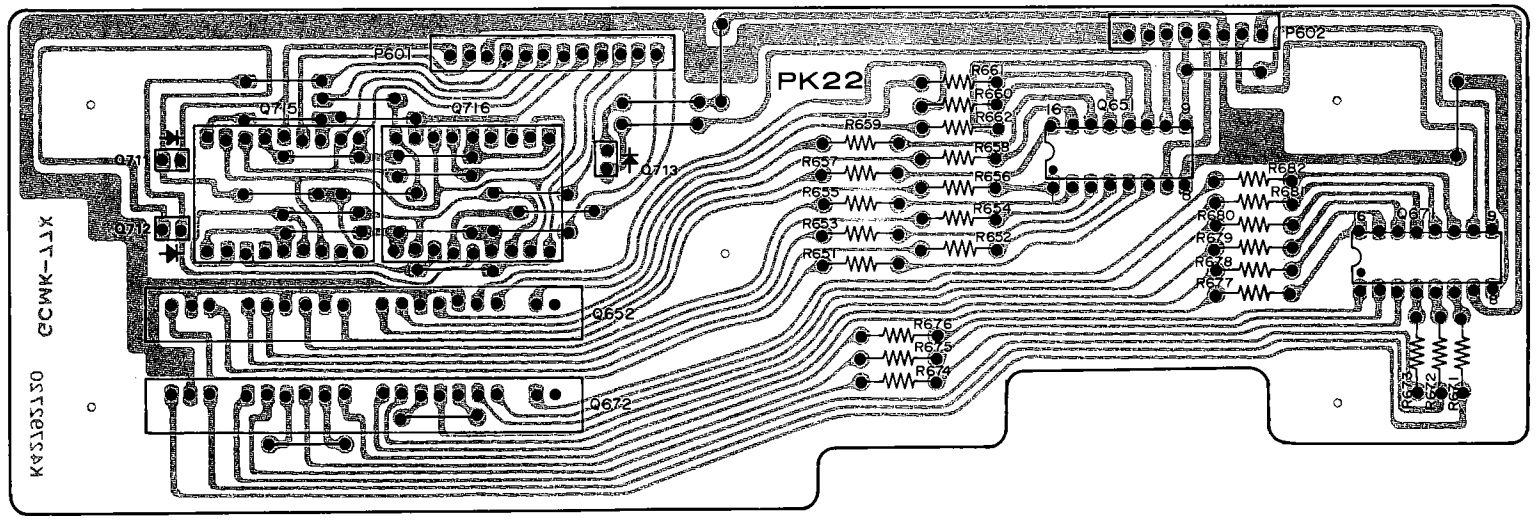
6 Power Supply and Bias OSC Assembly (P400) Schematic Diagram and Component Locations



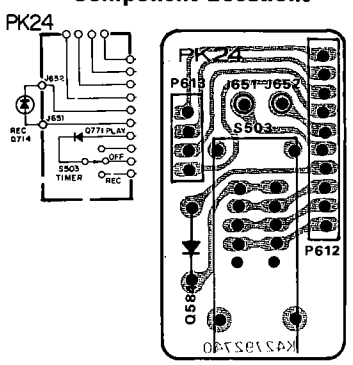


7 Digital and Meter LED Assembly (PK22) Schematic Diagram and Component Locations

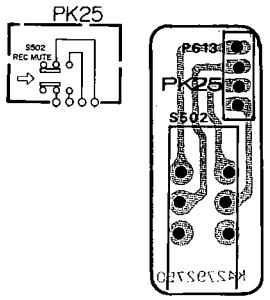




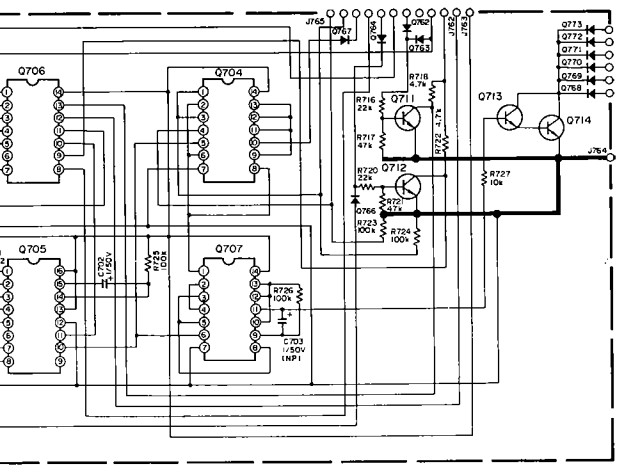
7.8 Timer Switch Assembly (PK24) Schematic Diagram and Component Locations

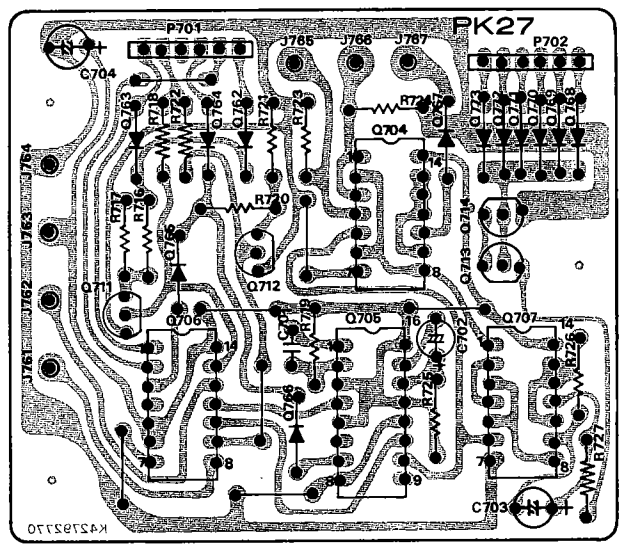


7.9 Rec-Mute Switch Assembly (PK25) Schematic Diagram and Component Locations

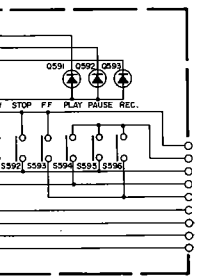


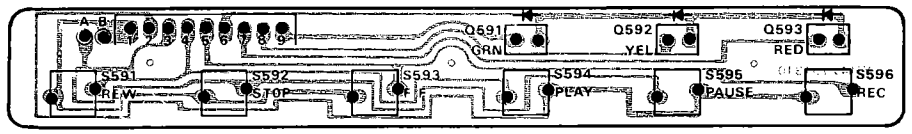
ogram Select Assembly (PK27) Schematic Diagram and Component Locations



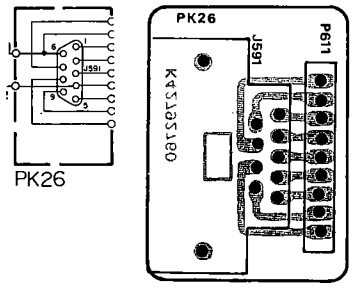


gic Control Assembly (PK31) Schematic Diagram and Component Locations

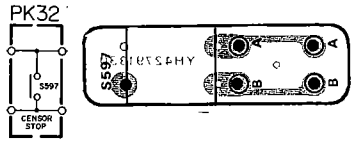




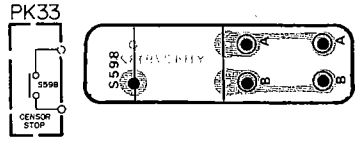
7.12 Remote Jack Assembly (PK26) Schematic Diagram and Component Locations



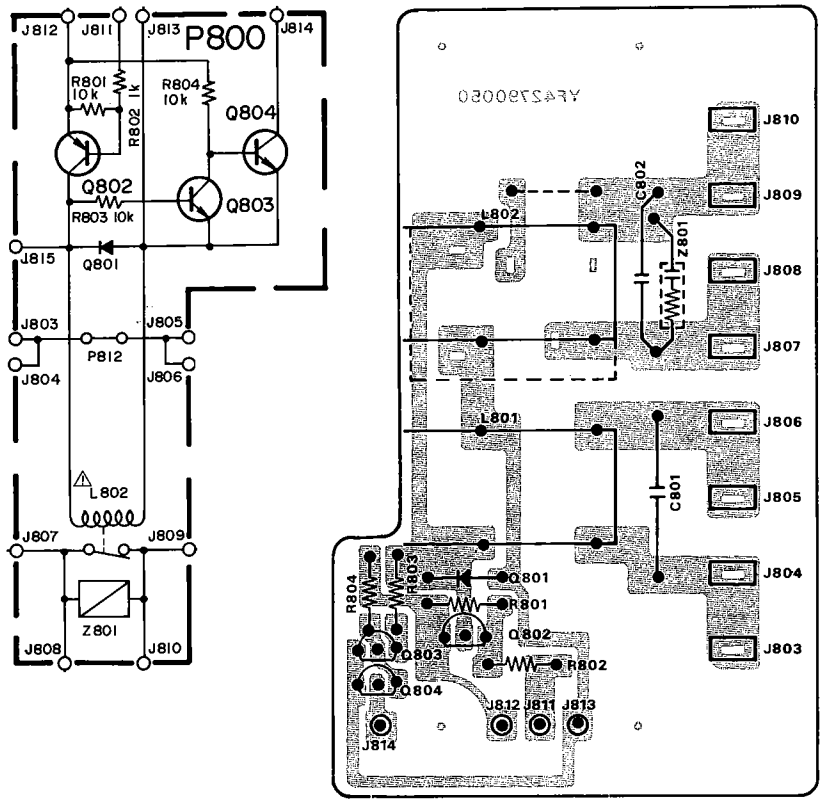
7.13 Safety Switch Assembly (PK32) Schematic Diagram and Component Locations



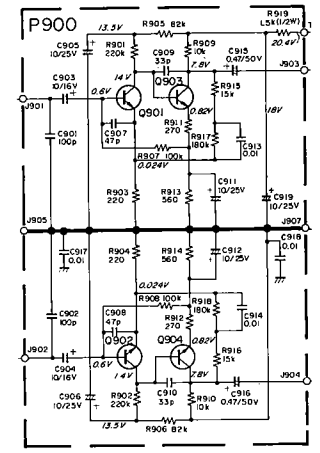
7.14 Safety Switch Assembly (PK33) Schematic Diagram and Component Locations

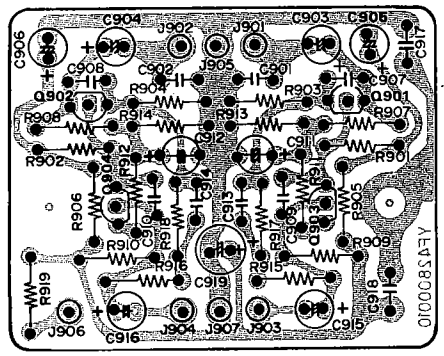


7.15 Timer Relay Assembly (P800) Schematic Diagram and Component Locations

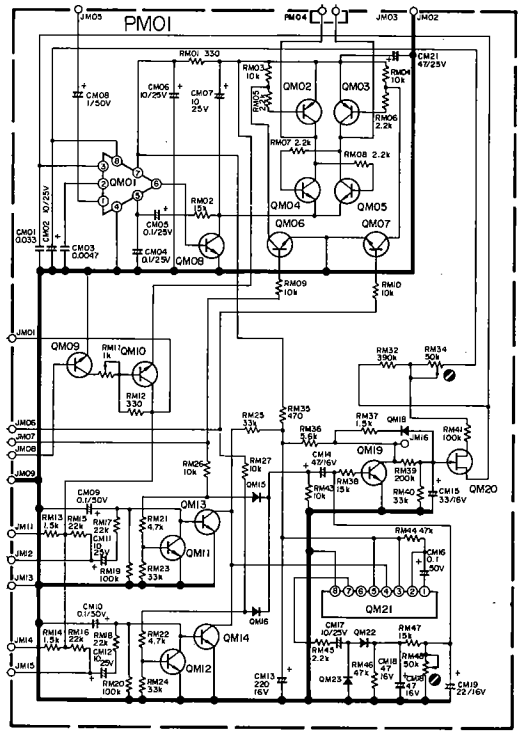


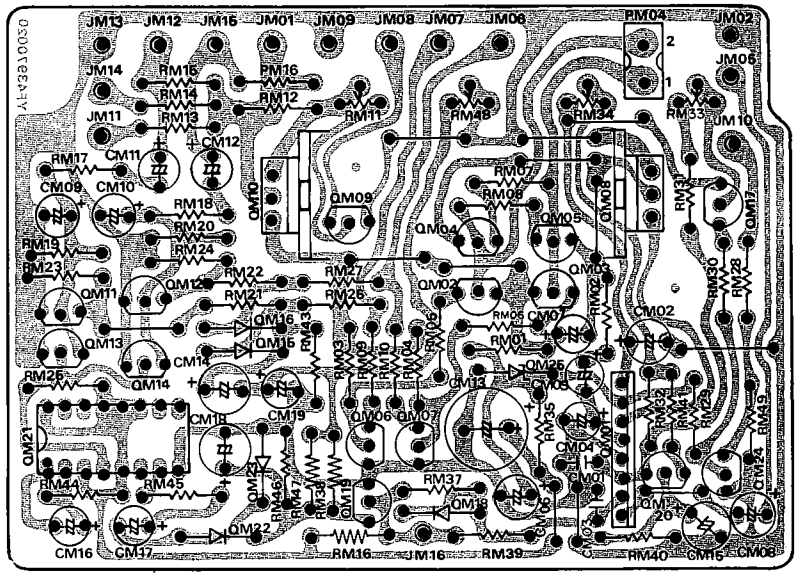
7.16 Pre-Amp. Music Interval DET Assembly (P900) Schematic Diagram and Component Locations



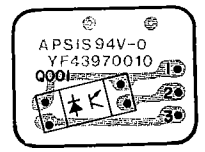


7.17 Motor Governor Assembly (PM01) Schematic Diagram and Component Locations

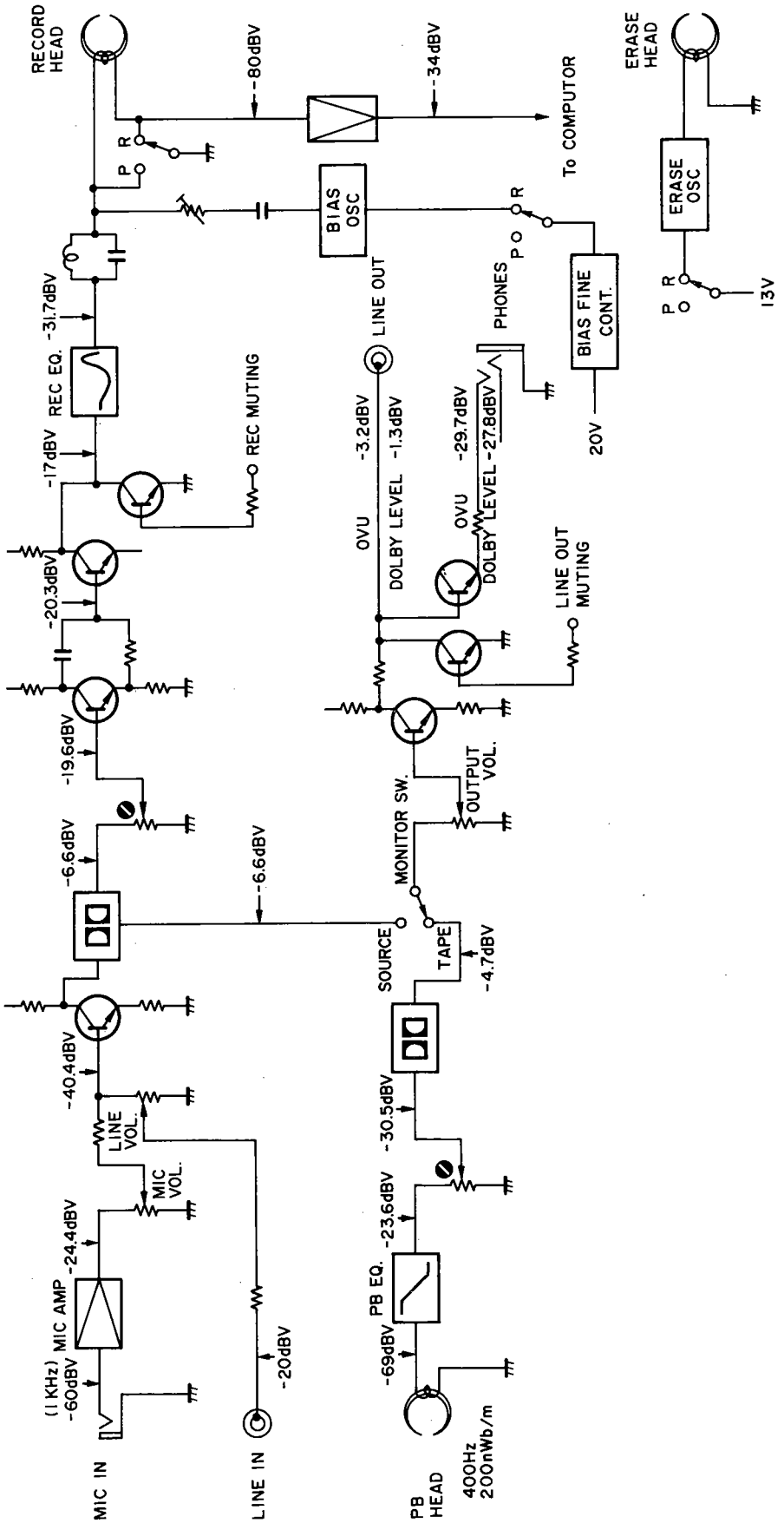




7.18 Photo Coupler Assembly (P001) Component Locations

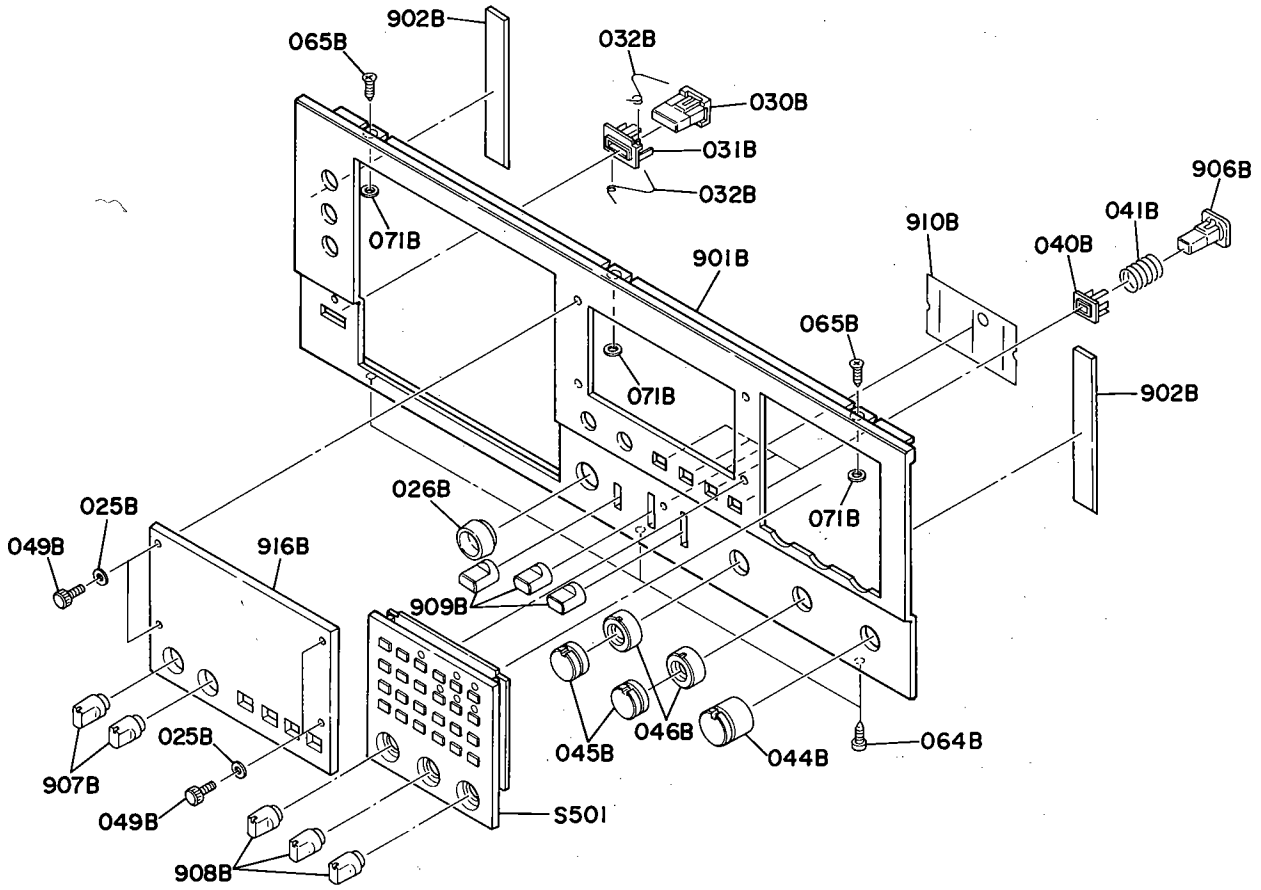


8. BLOCK DIAGRAM



9. EXPLODED VIEW AND PARTS LIST

- **[P01-99] Front Panel**

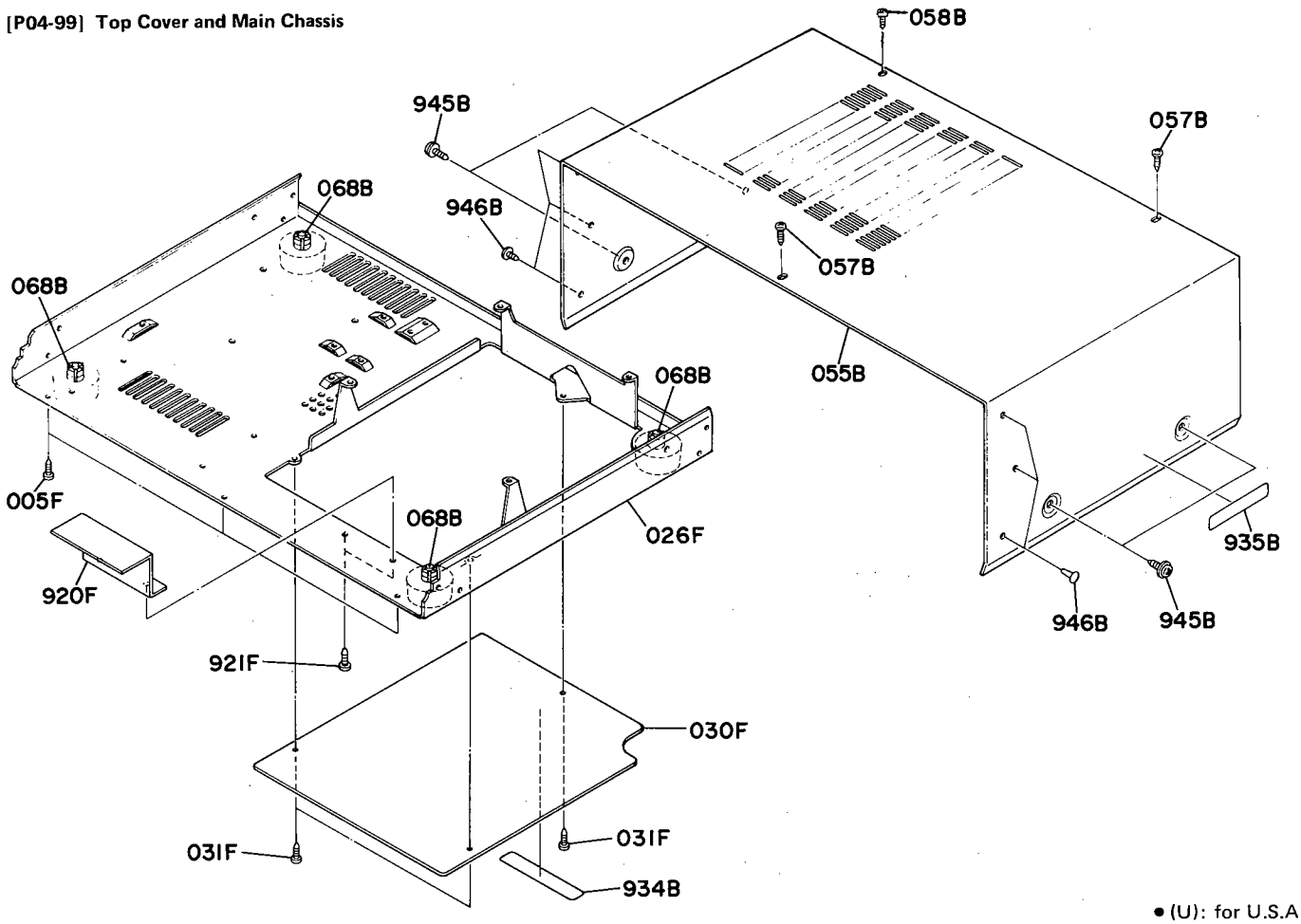


- (U): for U.S.A.
- (C): for Canada

REF. DESIG.	Q'TY U	Q'TY C	PART NO.	DESCRIPTION
A	1	1	4280063400	Front Panel Assembly
026B	1	1	4276259010	Bush, Rec Mute
031B	1	1	2127259010	Bush, Power Switch
040B	2	2	2112259030	Bush, Tape Selector
901B	1	1	4280063010	Escutcheon, Front Panel
902B	2	2	4279118010	Spacer
910B	1	1	4280107010	Sheet, Lever Switch

REF. DESIG.	Q'TY U	Q'TY C	PART NO.	DESCRIPTION
025B	4	4	59046502G9	Washer
030B	1	1	2127154010	Knob, Power Switch
032B	2	2	2127115010	Spring
041B	4	4	2112115010	Spring
044B	1	1	4278154010	Knob, Output
045B	2	2	4278154020	Knob, Record
046B	2	2	4278154030	Knob, Record
049B	4	4	4279112020	Shaft, Meter Window
064B	3	3	51280306B0	B.H. Tapped Screw B3 x 6
065B	2	2	51500306B0	F.H. Taptite Screw F3 x 6
071B	3	3	59030808P0	Washer
906B	4	4	4279154010	Knob, Tape Selector
907B	2	2	4276154010	Knob, Speed/Bias
908B	3	3	4276154010	Knob
909B	3	3	2970154020	Knob, Lever Switch
916B	1	1	4279158010	Window, Dial
S501	1	1	SK10240010	Keyboard Switch

- [P04-99] Top Cover and Main Chassis

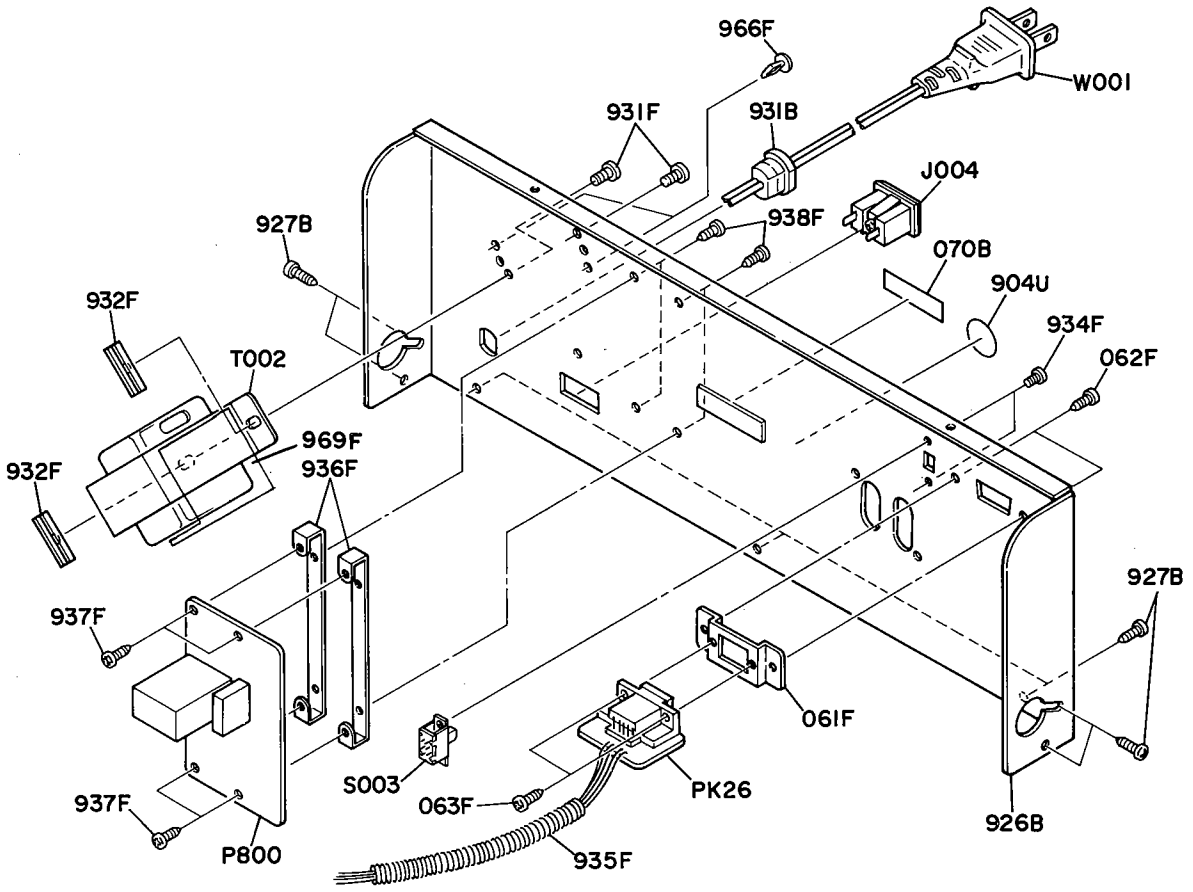


- (U): for U.S.A.
- (C): for Canada

REF. DESIG.	Q'TY U	Q'TY C	PART NO.	DESCRIPTION
055B	1	1	4279257010	Lid, Top Cover
057B	2	2	51280308U0	B.H. Tapped Screw B3 x 8
058B	1	1	51280305U0	B.H. Tapped Screw B3 x 5
068B	4	4	2259057010	Leg
934B	1		3889861010	Label
934B		1	4113861020	Label
935B	1		2932861010	Label
935B		1	2911861140	Label
945B	4	4	51480406S0	F. Washer Screw 4 x 8
946B	6	6	2991259010	Bushing

REF. DESIG.	Q'TY U	Q'TY C	PART NO.	DESCRIPTION
005F	3	3	51280306B0	B.H. Tapped Screw B3 x 6
026F	1	1	4279105010	Chassis
030F	1	1	4279257020	Lid
031F	3	3	5128030680	B.H. Tapped Screw B3 x 6
920F	1	1	4279109030	Shield
921F	2	2	51280306B0	B.H. Tapped Screw B3 x 6

- [P06-99] Rear Panel

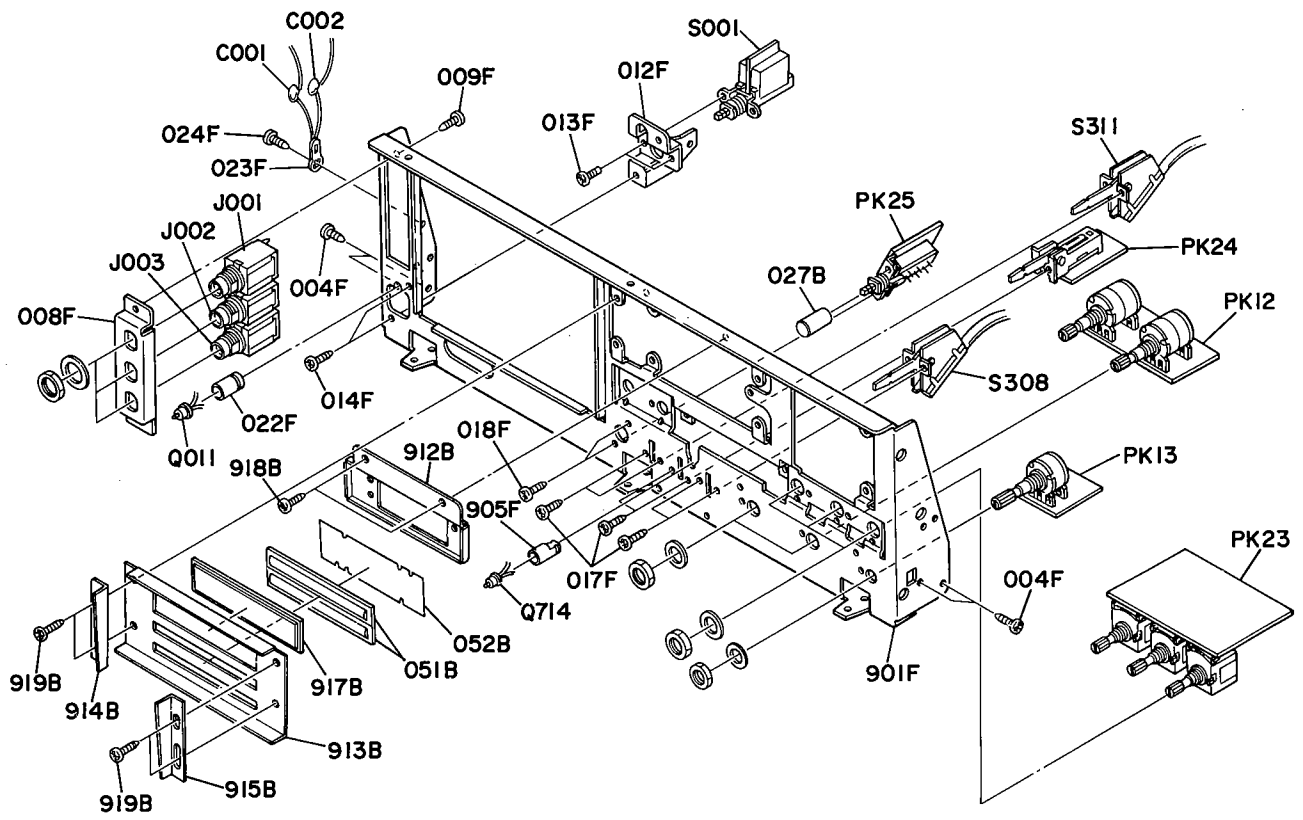


- (U): for U.S.A.
- (C): for Canada

REF. DESIG.	Q'TY U	Q'TY C	PART NO.	DESCRIPTION
070B	1	1	2112265010	Indicator, Serial No.
926B	1	1	4280160010	Bracket, Rear Panel
927B	7	7	51280306U0	B.H. Tapped Screw B3 x 6
931B	1	1	1455259030	Bushing
061F	1	1	4279160120	Bracket, Remote Jack
062F	2	2	51280306U0	B.H. Tapped Screw B3 x 6
063F	2	2	5128030680	B.H. Tapped Screw B3 x 6
931F	2	2	5110040859	B.H.M. Screw B4 x 8
932F	2	2	2922005010	Clamper
934F	2	2	51100203S0	B.H.M. Screw B2 x 3
935F	1	1	4279109040	Shield
936F	2	2	3889160090	Bracket
937F	4	4	51100306A9	B.H.M. Screw B3 x 6
938F	4	4	5110030659	B.H.M. Screw B3 x 6
966F	2	2	74420029G0	Hole Plug
969F	1	1	4280109010	Shield for Transformer

REF. DESIG.	Q'TY U	Q'TY C	PART NO.	DESCRIPTION
904U	1		9511101070	Label, UL
904U		1	2457861040	Label, CSA
⚠J004	1	1	YJ04000560	Jack, AC Outlet
S003	1	1	SS02020610	Slide Switch
⚠T002	1	1	TS15406240	Power Transformer
⚠W001	1	1	YC02000140	A.C. Power Cord

- [P03-99] Front Bracket

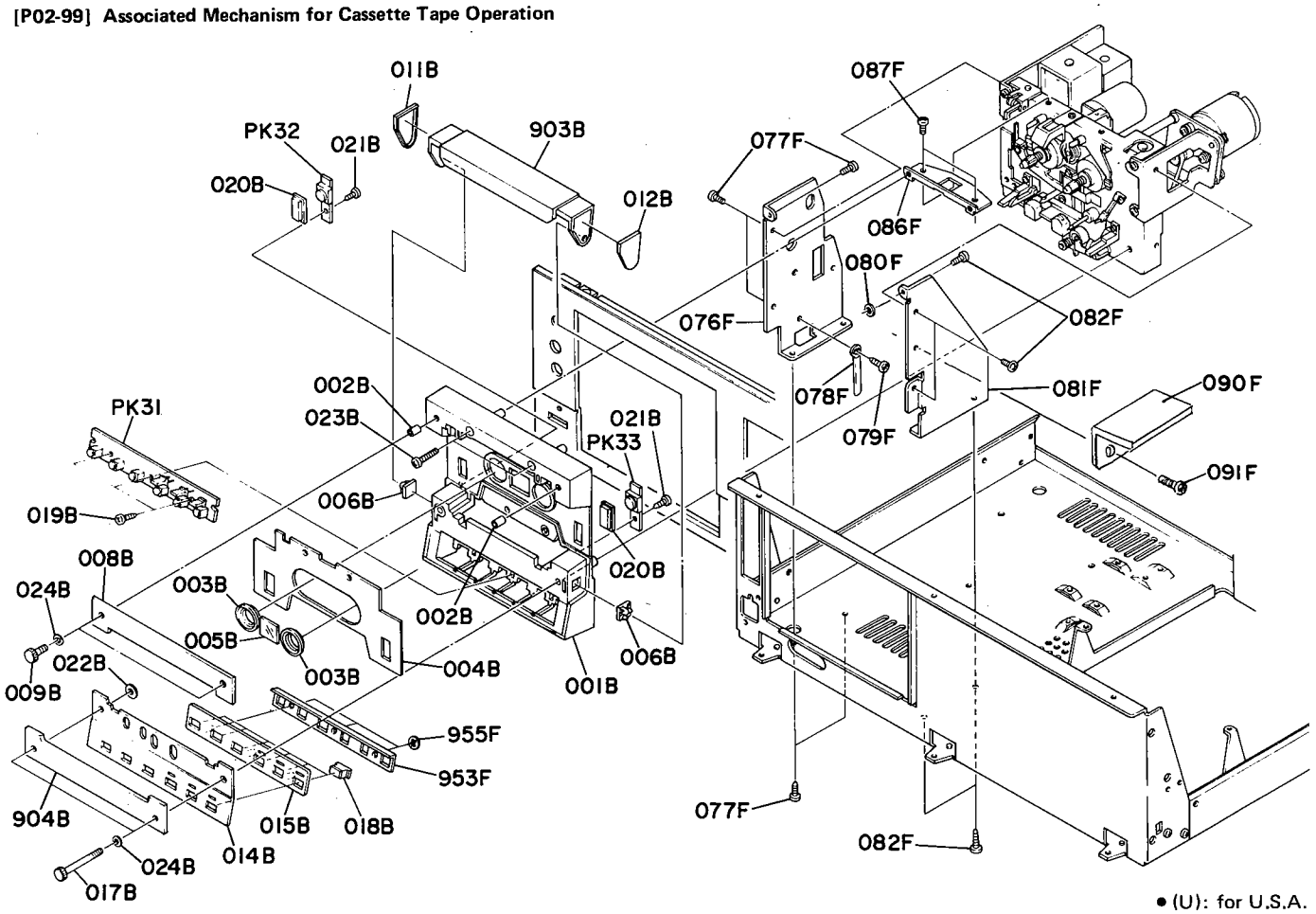


- (U): for U.S.A.
- (C): for Canada

REF. DESIG.	Q'TY U	Q'TY C	PART NO.	DESCRIPTION
E	1	1	4279302400	Dial Assembly, LED
051B	2	2	2127355010	Lens, LED Meter
052B	1	1	2129303040	Mask, LED Lens
913B	1	1	4279302010	Dial, LED Meter
027B	1	1	4279154070	Knob, Rec Mute
912B	1	1	4279303010	Mask
914B	1	1	4279303020	Mask, Dial
915B	1	1	4279303030	Mask, Dial
917B	1	1	4279158030	Window, Counter
918B	2	2	51280306B0	B.H. Tapped Screw B3 x 6
919B	4	4	51280306B0	B.H. Tapped Screw B3 x 6
004F	4	4	51280306B0	B.H. Tapped Screw B3 x 6
008F	1	1	4279160130	Bracket, Jack
009F	1	1	51280306B0	B.H. Tapped Screw B3 x 6
012F	1	1	4279160140	Bracket, Power Switch
013F	2	2	51100306A9	B.H.M. Screw B3 x 6
014F	2	2	51280306B0	B.H. Tapped Screw B3 x 6
017F	6	6	51100306A9	B.H.M. Screw B3 x 6
018F	2	2	51100306A9	B.H.M. Screw B3 x 6
022F	2	2	4279271010	Holder, LED
023F	1	1	62031650W0	Lug

REF. DESIG.	Q'TY U	Q'TY C	PART NO.	DESCRIPTION
024F	1	1	51280306B0	B.H. Tapped Screw B3 x 6
901F	1	1	4279160010	Bracket, Front Chassis
905F	1	1	4279271010	Holder, Timer LED
C001	1	1	DK18102300	Ceramic Cap, 0.001μF
C002	1	1	DK18102300	Ceramic Cap, 0.001μF
J001	1	1	YJ01001110	Jack, Mic (L)
J002	1	1	YJ01001110	Jack, Mic (R)
J003	1	1	YJ01001360	Jack, Head Phone
⚠ S001	1	1	SP01010280	Push Switch, Power
S308	1	1	SC00030030	Switch, 3 Position
S311	1	1	SC00020030	Switch, 2 Position
Q011	1	1	HI10009300	L.E.D. Power
Q714	1	1	HI10009300	L.E.D. Timer Rec

- **[P02-99] Associated Mechanism for Cassette Tape Operation**

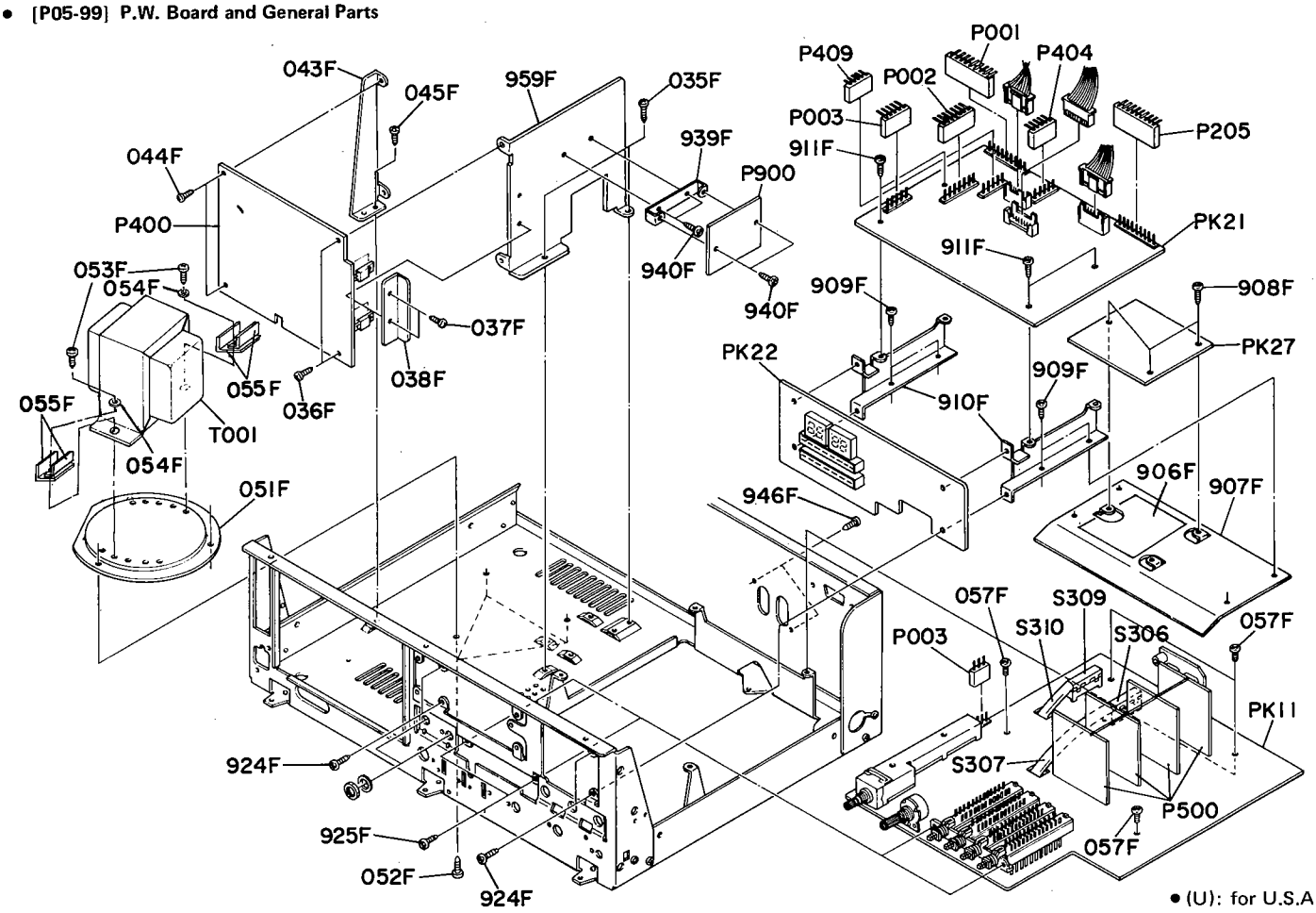


- (U): for U.S.A.
- (C): for Canada

REF. DESIG.	Q'TY U	Q'TY C	PART NO.	DESCRIPTION
B	1	1	4279053400	Cover Assembly
001B	1	1	4279053010	Cover, Mechanism
002B	2	2	65010306G0	Dodge Insert, S
003B	2	2	4279353010	Ring, Reel
004B	1	1	4279063050	Escutcheon, Cassette
005B	1	1	4279274010	Refrector
C	1	1	4280053410	Head Cover Assembly
011B	1	1	4279063060	Escutcheon, Head Cover (L)
012B	1	1	4279063070	Escutcheon, Head Cover (R)
903B	1	1	4279053030	Cover, Head
D	1	1	4279063420	Escutcheon Assembly
014B	1	1	4279063040	Escutcheon
015B	1	1	4279259010	Bush

REF. DESIG.	Q'TY U	Q'TY C	PART NO.	DESCRIPTION
006B	2	2	4279104010	Retainer
008B	1	1	4279063030	Escutcheon, Brand
009B	2	2	4279112020	Shaft
017B	2	2	4279112030	Shaft
018B	6	6	4279154020	Knob, Meca Button
019B	3	3	51282606B0	B.H. Tapped Screw B2.6 x 6
020B	2	2	4279154060	Knob, Senser
021B	2	2	51282606B0	B.H. Tapped Screw B2.6 x 6
022B	1	1	4280121010	Link
023B	2	2	5273031289	H.S. Head Bolt 3 x 12
024B	4	4	59046502G9	Washer
904B	1	1	4279158060	Window, Azimuth Cover
076F	1	1	4279160040	Bracket (L)
077F	6	6	51280306B0	B.H. Tapped Screw B3 x 6
080F	1	1	59030805P0	Washer
081F	1	1	4279160050	Bracket (R)
082F	5	5	51280306B0	B.H. Tapped Screw B3 x 6
086F	1	1	4279160160	Bracket
087F	2	2	51060303A9	P.H.M. Screw P3 x 3
953F	1	1	4280104010	Retainer
955F	3	3	64020300Q0	RG Ring, CS Type
078F	1	1	4220005030	Clamper
079F	1	1	51280306B0	B.H. Tapped Screw B3 x 6
090F	1	1	4279104020	Retainer
091F	1	1	51280308B0	B.H. Tapped Screw B3 x 8

- [P05-99] P.W. Board and General Parts



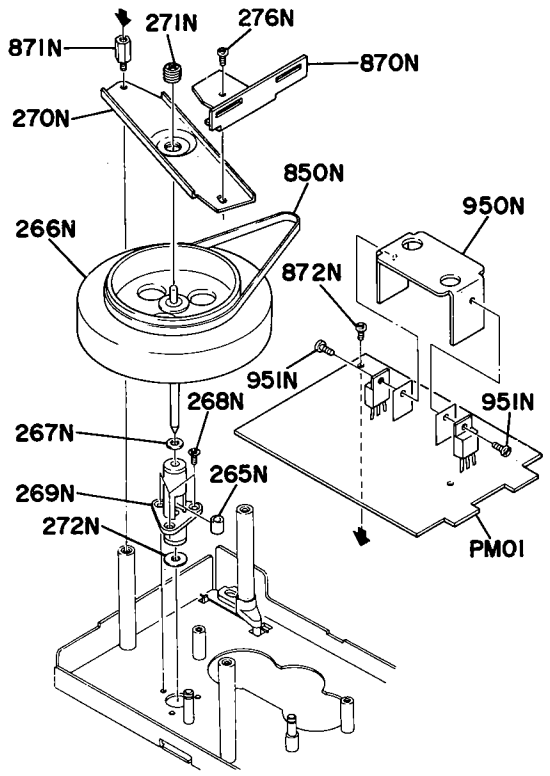
- (U): for U.S.A.
- (C): for Canada

REF. DESIG.	Q'TY U	Q'TY C	PART NO.	DESCRIPTION
035F	2	2	51280308B0	B.H. Tapped Screw B3 x 8
036F	2	2	51280310B0	B.H. Tapped Screw B3 x 10
037F	2	2	51280310B0	B.H. Tapped Screw B3 x 10
038F	1	1	4279005010	Clamper
043F	1	1	4279160060	Bracket
044F	2	2	51280310B0	B.H. Tapped Screw B3 x 10
045F	1	1	51280308B0	B.H. Tapped Screw B3 x 8
051F	1	1	4279160110	Bracket, Transf.
052F	3	3	51280406B0	B.H. Tapped Screw B4 x 6
053F	4	4	51280408B0	B.H. Tapped Screw B4 x 8
057F	4	4	51280306B0	B.H. Tapped Screw B3 x 6
906F	1	1	4279120020	Insulator
907F	1	1	4279109020	Shield
908F	3	3	51280306B0	B.H. Tapped Screw B3 x 6
909F	4	4	51280306B0	B.H. Tapped Screw B3 x 6
910F	2	2	4279160080	Bracket
911F	4	4	51280306B0	B.H. Tapped Screw B3 x 6
924F	4	4	51280308B0	B.H. Tapped Screw B3 x 8
925F	2	2	51100306A9	B.H.M. Screw B3 x 6
939F	1	1	2963160150	Bracket
940F	4	4	51280306B0	B.H. Tapped Screw B3 x 6
054F	2	2	54040402N0	Washer
055F	2	2	4265005010	

REF. DESIG.	Q'TY U	Q'TY C	PART NO.	DESCRIPTION
946F	2	2	51280308U0	B.H. Tapped Screw B3 x 8
959F	1	1	4279267020	Heat Sink
965F	2	2	4280112010	
S306	1	1	SS04030130	Slide Switch
S307	1	1	SB11910010	Switch Band, FLX
S309	1	1	SS04020420	Slide Switch
S310	1	1	SB11910020	Switch Band, FLX
⚠T001	1	1	TS16621010	Power Transformer
P001	1	1	YJ06001430	Jack (9P)
P002	1	1	YJ06001260	Jack (7P)
P003	1	1	YJ06001250	Jack (5P)
P003	1	1	YJ06001250	Jack (5P)
P205	1	1	YJ06001070	Jack (9P)
P404	1	1	YJ06001250	Jack (5P)
P409	1	1	YJ06001250	Jack (5P)

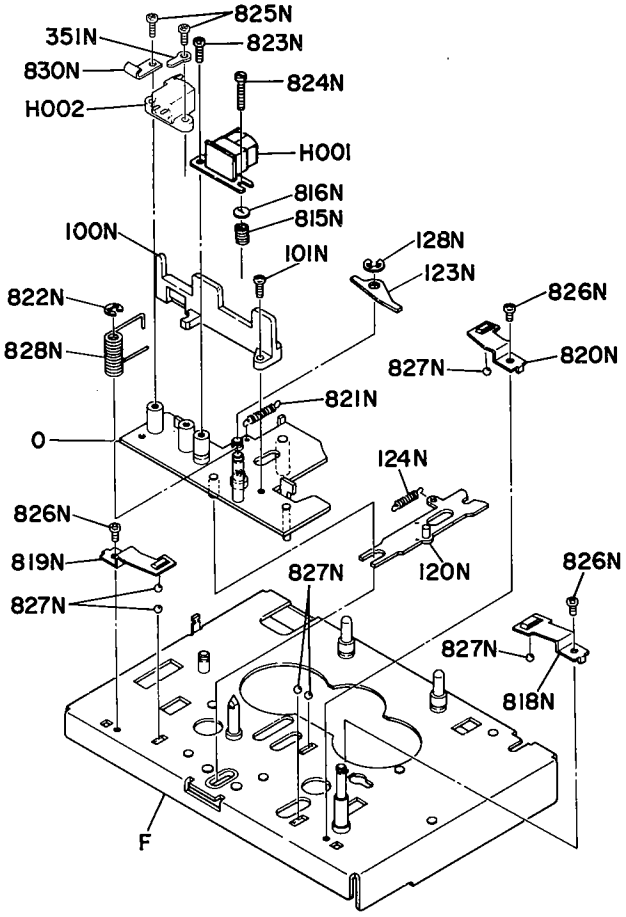
• (U): for U.S.A.
• (C): for Canada

• [P07-99] Flywheel



REF. DESIG.	Q'TY U	Q'TY C	PART NO.	DESCRIPTION	
N	1	1	4397106400	Sustainer Assembly	
265N	1	1	4397262030	Collar	
266N	1	1	4397273500	Flywheel (K)	
267N	1	1	59030802G9	Spacer	
269N	1	1	4397106020	Sustainer, Capstan	
268N	3	3	51042604A0	F.H.M. Screw	F2.6 x 4
270N	1	1	4397104010	Retainer	
271N	1	1	3483164020	Adjuster	
272N	1	1	4397118010	Spacer	
276N	1	1	51060305A9	P.H.M. Screw	P3 x 5
850N	1	1	4397264010	Belt	
870N	1	1	4397104050	Retainer	
871N	1	1	2838101010	Support	
872N	1	1	51060304A9	P.H.M. Screw	P3 x 4
950N	1	1	4397267010	Heatsink	
951N	2	2	50060305B9	Screw	3 x 5

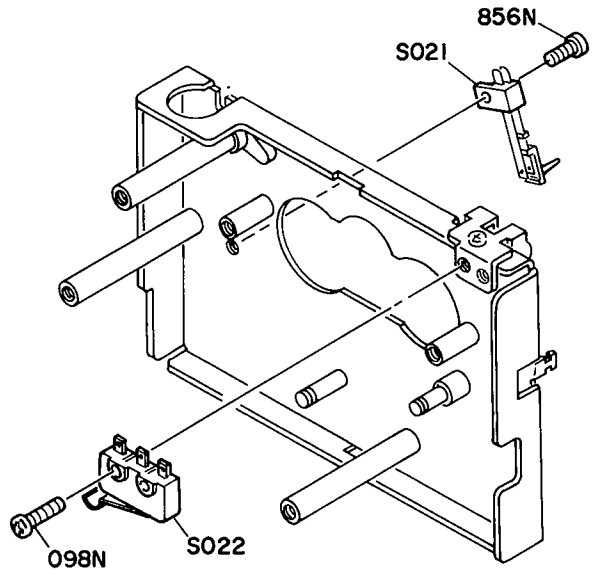
• [P08-99] Head Chassis



REF. DESIG.	Q'TY U	Q'TY C	PART NO.	DESCRIPTION	
F	1	1	4397105400	Chassis Assembly	
O	1	1	4397105420	Chassis Assembly, Head	
100N	1	1	4397053010	Cover, Head Chassis	
101N	1	1	51060206A0	P.H.M. Screw	P2 x 6
120N	1	1	4397354500	Lever, (K) F/R	
123N	1	1	4397002050	Arm, F/R	
124N	1	1	4397115190	Spring	
128N	1	1	64002500R0	RG Ring, E Type	
351N	1	1	62021030W0	Lug	
815N	1	1	4380115090	Spring, Azimuth	
816N	1	1	344118070	Spacer	
818N	1	1	4397115070	Spring	
819N	1	1	4397115080	Spring (L)	
820N	1	1	4397115090	Spring (R)	
821N	1	1	4397115130	Spring	
822N	1	1	64002500R0	RG Ring, E Type	
823N	1	1	51060204A0	P.H.M. Screw	P2 x 4
824N	1	1	4397254090	Pin	
825N	2	2	51060206A0	P.H.M. Screw	P2 x 6
826N	3	3	51062603A0	P.H.M. Screw	P2.6 x 3
827N	6	6	61025010T0	Ball	
828N	1	1	4397115200	Spring	
830N	1	1	4411005020	Clamper	
H001	1	1	LH82132010	Rec/Play Head	
H002	1	1	LH31000510	Erase Head	

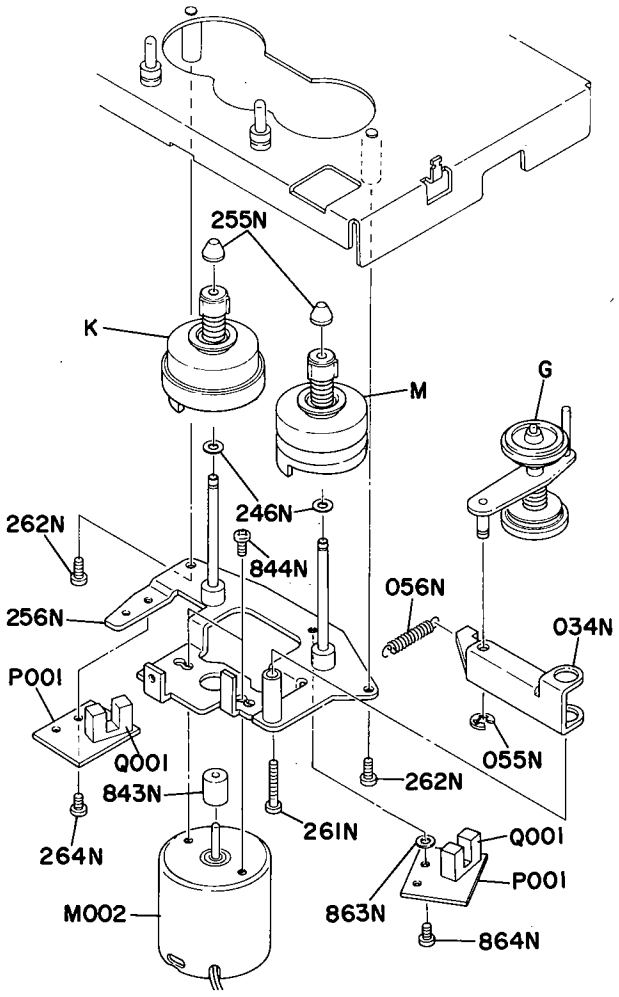
• (U): for U.S.A.
• (C): for Canada

• [P09-99] Switch Location



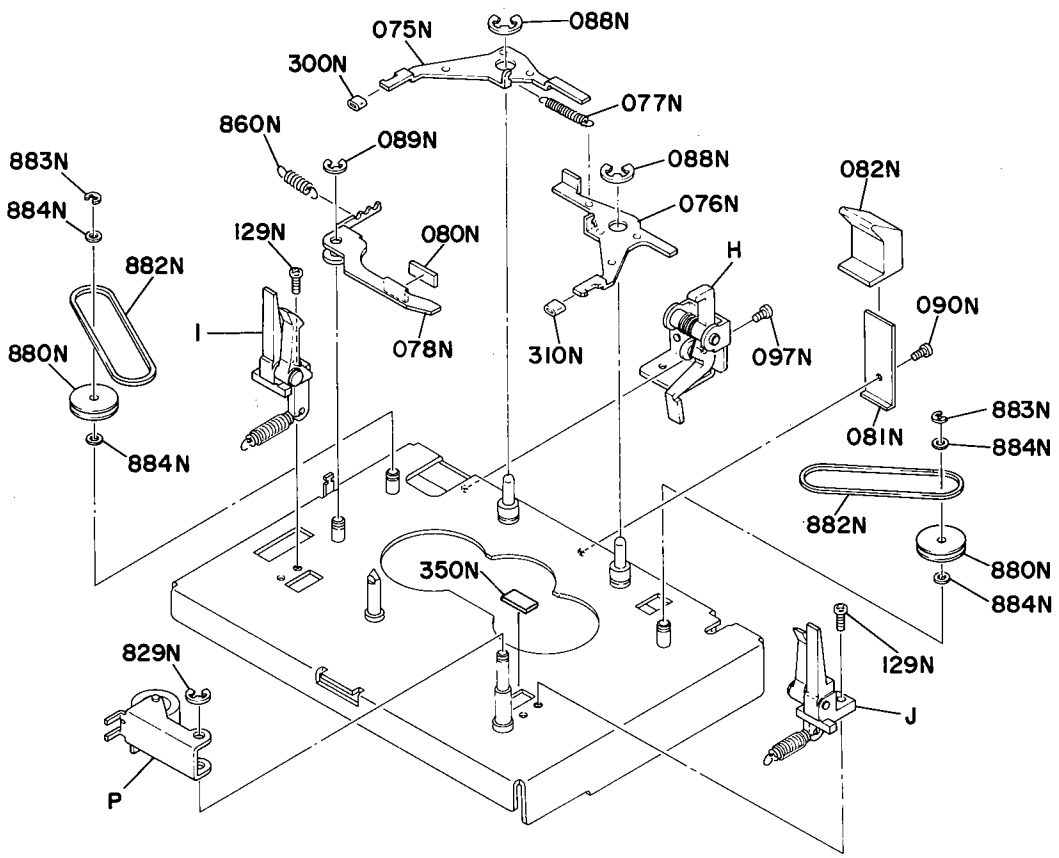
REF. DESIG.	Q'TY U	Q'TY C	PART NO.	DESCRIPTION	
098N	1	1	51060208A0	P.H.M. Screw	P2 x 8
856N	1	1	51062605A0	P.H.M. Screw	P2.6 x 5
S021	1	1	SM01010740	Mini Switch, Cassette	
S022	1	1	SC01020340	Micro Switch	

• [P10-99] Pulley



REF. DESIG.	Q'TY U	Q'TY C	PART NO.	DESCRIPTION	
G	1	1	4397002420	Arm Assembly, FF/REW	
K	1	1	4397004400	Table Assembly, Take up	
M	1	1	4397004410	Table Assembly, Supply	
034N	1	1	4397354150	Lever, F/R	
055N	1	1	64002500R0	RG Ring, E Type	
056N	1	1	4397115010	Spring	
246N	2	2	59020402G9	Washer	
255N	2	2	4367067010	Cap, Reel Table	
256N	1	1	4397160500	Bracket (K) Reel	
261N	1	1	51062620A0	P.H.M. Screw	P2.6 x 20
262N	2	2	51062606A0	P.H.M. Screw	P2.6 x 6
264N	1	1	51062604A0	P.H.M. Screw	P2.6 x 4
843N	1	1	4397262020	Pulley, Reel Motor	
844N	2	2	51062603A0	P.H.M. Screw	P2.6 x 3
863N	1	1	54110159A0	Flat Washer, L.	
864N	1	1	51062604A0	P.H.M. Screw	P2.6 x 4
⚠ M002	1	1	MM01200080	D.C. Motor, FF/REW	
Q001	2	2	HW10001030	Photo Unit	
P001	2	2	YF43970010	P.W. Board, Photo Couplar	
	2	2	ZZ43970010	P.W. Board Assembly	

- [P12-99] Parts Assembly on the Top Chassis

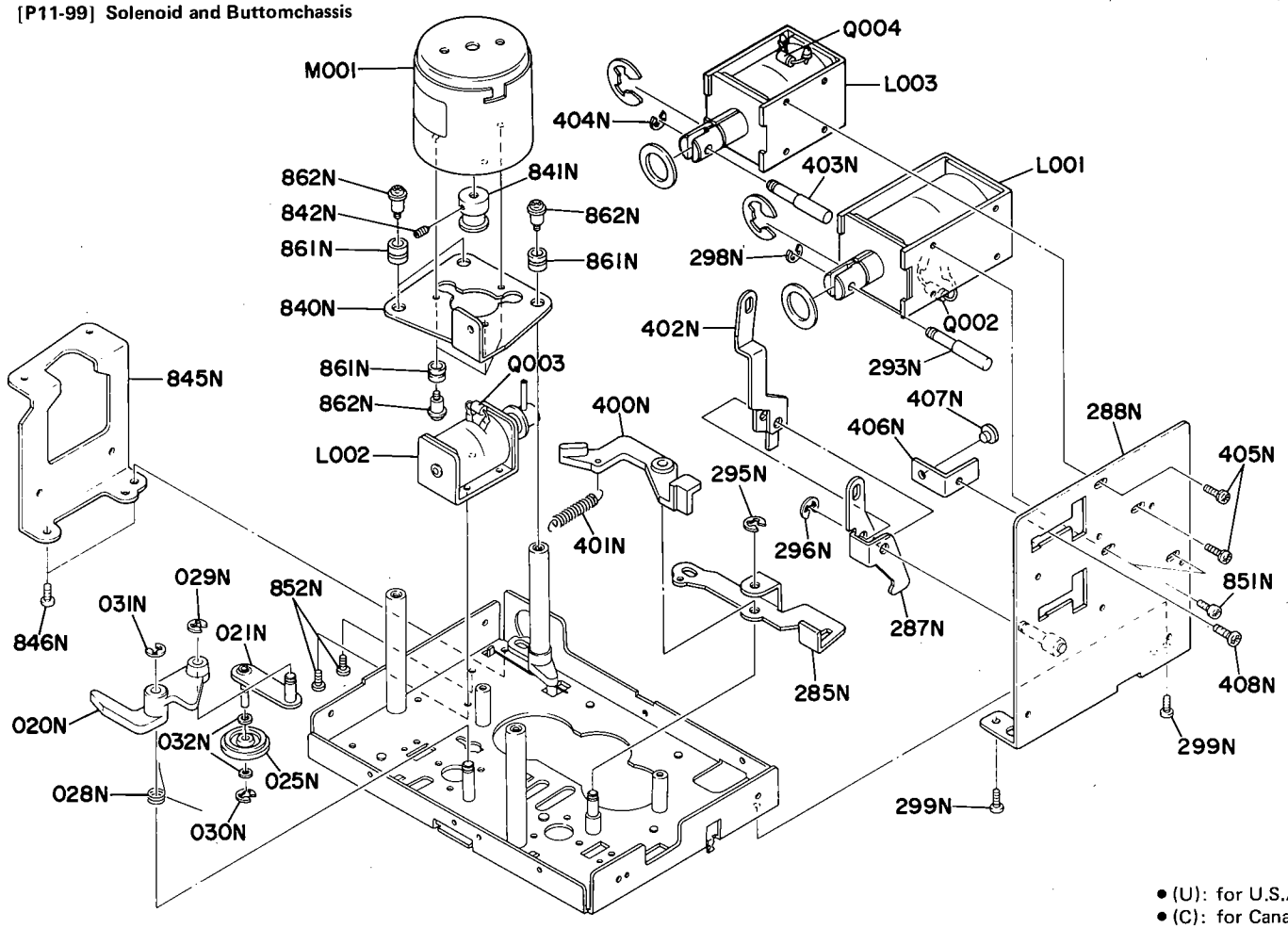


- (U): for U.S.A.
- (C): for Canada

REF. DESIG.	Q'TY U	Q'TY C	PART NO.	DESCRIPTION
H	1	1	4397104420	Retainer Assembly
I	1	1	4397104400	Retainer Assembly, Cassette
J	1	1	4397104410	Retainer Assembly, Cassette
P	1	1	4397354410	Lever Assembly, Pinch Roller
075N	1	1	4397354040	Brake Lever (L)
076N	1	1	4397354030	Brake Lever (R)
077N	1	1	4397115100	Spring
078N	1	1	4397354090	Lever, Back Tension
080N	1	1	4397061030	Clutch, Back Tension
081N	1	1	4397115020	Spring
082N	1	1	4397053020	Cover
088N	2	2	64000400R0	RG Ring, E Type
089N	1	1	64002500R0	RG Ring, E Type

REF. DESIG.	Q'TY U	Q'TY C	PART NO.	DESCRIPTION	
090N	1	1	51062603A0	P.H.M. Screw	P2.6 x 3
097N	1	1	51062604A0	P.H.M. Screw	P2.6 x 4
300N	1	1	4367263010	Brake	
301N	1	1	4367263010	Brake	
350N	1	1	4397120010	Insulator	
829N	1	1	64002500R0	RG Ring, E Type	
860N	1	1	4397115210	Spring, Back Tension	
880N	2	2	4397262040	Pulley	
882N	2	2	4397264020	Belt	
883N	2	2	64001500R0	RG Ring, E Type	
884N	4	4	59020402G9	Washer	
129N	2	2	51062606A0	P.H.M. Screw	P2.6 x 6

- [P11-99] Solenoid and Buttomchassis

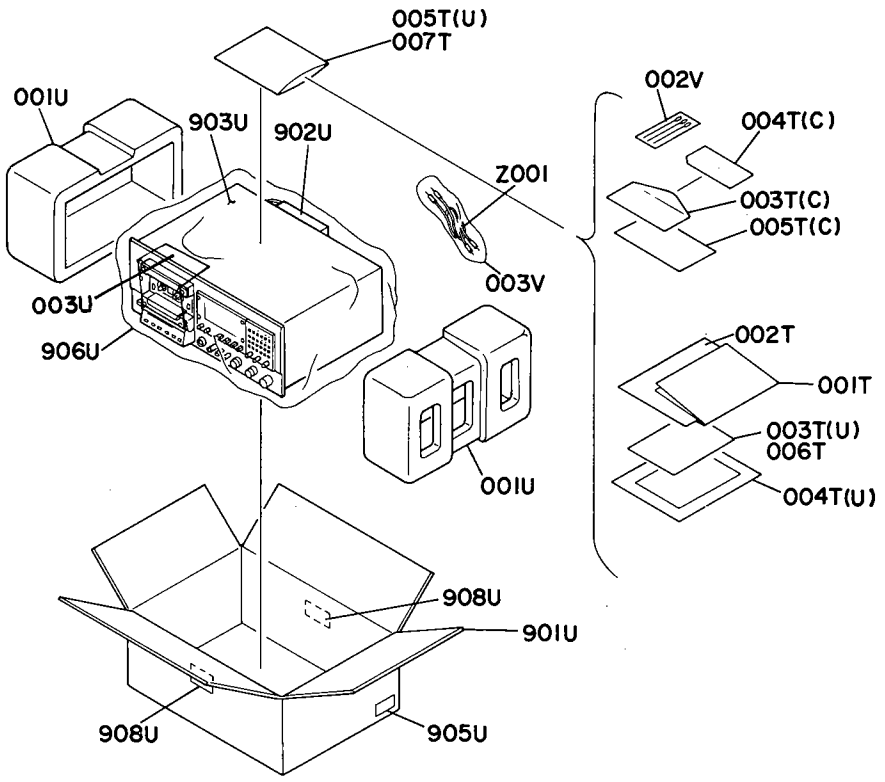


- (U): for U.S.A.
- (C): for Canada

REF. DESIG.	Q'TY U	Q'TY C	PART NO.	DESCRIPTION	
020N	1	1	4397354080	Lever, Take up	
021N	1	1	4397002500	Arm (K) Take up	
025N	1	1	4397001510	Idler, Take up	
028N	1	1	4397115150	Spring	
029N	1	1	64000200R0	RG Ring, E Type	
030N	1	1	64001200R0	RG Ring, E Type	
031N	1	1	64002500R0	RG Ring, E Type	
032N	2	2	59163202G9	Washer	
285N	1	1	4397354070	Lever, Play	
287N	1	1	4397354060	Lever, Solenoid	
288N	1	1	4397160510	Bracket (K)	
293N	1	1	4397254080	Pin	
295N	1	1	64000300R0	RG Ring, E Type	
296N	1	1	64000300R0	RG Ring, E Type	
298N	1	1	64002500R0	RG Ring, E Type	
299N	2	2	51100306A9	B.H.M. Screw	B3 x 6
400N	1	1	4397354110	Lever	
401N	1	1	4397115170	Spring	
402N	1	1	4397354120	Lever	
403N	1	1	4397254130	Pin	
404N	1	1	64002500R0	RG Ring, E Type	
405N	2	2	51440306A9	L. Washer Screw	L3 x 6
406N	1	1	4397114010	Stopper	
407N	1	1	3312056030	Buffer	
408N	1	1	51100405A9	B.H.M. Screw	B4 x 5

REF. DESIG.	Q'TY U	Q'TY C	PART NO.	DESCRIPTION	
840N	1	1	4397160020	Bracket, Motor	
841N	1	1	4397262010	Pulley	
842N	1	1	5169030509	Socket Screw, HP	3 x 5
845N	1	1	4397160060	Bracket, Motor	
846N	2	2	51060304A9	P.H.M. Screw	P3 x 4
851N	2	2	51440306A9	L. Washer Screw	L3 x 6
852N	2	2	51102604A0	B.H.M. Screw	B2.6 x 4
861N	6	6	4383259010	Bushing	
862N	6	6	4367112150	Shaft	
⚠ L001	1	1	ME10630010	Solenoid Coil, Play	
⚠ L002	1	1	ME10410010	Solenoid Coil, Brake	
⚠ L003	1	1	ME10510010	Solenoid Coil, CUE/REV	
⚠ M001	1	1	MM11205010	D.C. Motor, 12V 2 Speed	
Q002	1	1	HD20023100	Diode	10E-1
Q003	1	1	HD20023100	Diode	10E-1
Q004	1	1	HD20023100	Diode	10E-1

- [H01-99] Packing Materials



- (U): for U.S.A.
- (C): for Canada

REF. DESIG.	Q'TY U	Q'TY C	PART NO.	DESCRIPTION
001T	1	1	4279851210	Instructions
002T	1	1	4280851220	Instructions
003T	1		2818854020	Guarantee Card
003T		1	2918813010	Envelope
004T	1		2225813010	Envelope
004T		1	9630000180	Guarantee Card
005T	1		9013025010	Polyethy Bag
005T		1	9650000050	S. Station Card
006T		1	2818854040	Guarantee Card
007T		1	9013025010	Polyethy Bag

REF. DESIG.	Q'TY U	Q'TY C	PART NO.	DESCRIPTION
001U	2	2	4279809010	Cushion
003U	1	1	4279269010	Protector
901U	1	1	4280801010	Packing Case
902U	1	1	2864804010	Sleeve
903U	1	1	2918107150	Sheet
905U	2		9526019010	Serial No. Card
905U		2	9526019020	Serial No. Card
906U	1	1	9090909040	Polyethy Sheet
908U		2	9510901020	Label, Address
002V	1	1	4136071010	Cleaner
003V	1	1	9011325010	Polyethy Bag
Z001	2	2	ZD01000170	Connective Cord

10. ELECTRICAL PARTS LIST

• (U): for U.S.A.
• (C): for Canada

REF. DESIG.	Q'TY U	Q'TY C	PART NO.	DESCRIPTION			
				PK11-PRE-AMP. CIRCUIT BOARD			
PK11	1	1	YK42801310	P.W. Board, Pre-Amp.			
	1	1	ZZ42801310	P.W. Board Assembly			
				PK11-CAPACITORS			
C101	1	1	EE10601640	Elect	10μF		16V
C102	1	1	EA10602530	Elect	10μF		25V
C103	1	1	DD15510300	Ceramic	51pF	±5%	
C104	1	1	DD15510300	Ceramic	51pF	±5%	
C105	1	1	DD15330300	Ceramic	33pF	±5%	
C107	1	1	EA10505030	Elect	1μF		50V
C108	1	1	EA10701030	Elect	100μF		10V
C109	1	1	EA47602530	Elect	47μF		25V
C110	1	1	EA47405030	Elect	0.47μF		50V
C111	1	1	EA10505030	Elect	1μF		50V
C112	1	1	EA47602530	Elect	47μF		25V
C113	1	1	DF15392300	Film	3900pF	±5%	
C114	1	1	DF15152300	Film	1500pF	±5%	
C115	1	1	DF55681090	Film	680pF	±5%	
C116	1	1	EA10602530	Elect	10μF		25V
C117	1	1	EA47405030	Elect	0.47μF		50V
C118	1	1	DF15222300	Film	2200pF	±5%	
C119	1	1	EA47405030	Elect	0.47μF		50V
C120	1	1	EA47505030	Elect	4.7μF		50V
C121	1	1	DF15122300	Film	1200pF	±5%	
C122	1	1	EA47505030	Elect	4.7μF		50V
C123	1	1	EA22405030	Elect	0.22μF		50V
C124	1	1	EA10602530	Elect	10μF		25V
C125	1	1	DF15223300	Film	0.022μF	±5%	
C126	1	1	DF15473300	Film	0.047μF	±5%	
C127	1	1	DF15473300	Film	0.047μF	±5%	
C128	1	1	DF15103300	Film	0.01μF	±5%	
C130	1	1	DF15153300	Film	0.015μF	±5%	
C131	1	1	DF15223300	Film	0.022μF	±5%	
C132	1	1	DF15223300	Film	0.022μF	±5%	
C133	1	1	DF15273300	Film	0.027μF	±5%	
C134	1	1	DF15153300	Film	0.015μF	±5%	
C135	1	1	DF15393300	Film	0.039μF	±5%	
C136	1	1	DF15103300	Film	0.01μF	±5%	
C137	1	1	DF15682300	Film	6800pF	±5%	
C138	1	1	DF15822300	Film	0.0082μF	±5%	
C139	1	1	DF15822300	Film	8200pF	±5%	
C140	1	1	DF15103300	Film	0.01μF	±5%	
C141	1	1	EE10601640	Elect	10μF		16V
C142	1	1	DF55151090	Film	150pF	±5%	
C143	1	1	EA10602530	Elect	10μF		25V
C144	1	1	DD15510300	Ceramic	51pF	±5%	
C145	1	1	DD15330300	Ceramic	33pF	±5%	
C146	1	1	EA10701030	Elect	100μF		10V
C147	1	1	EA22505030	Elect	2.2μF		50V
C148	1	1	DF15123300	Film	0.012μF	±5%	
C149	1	1	EA10505030	Elect	1μF		50V
C150	1	1	DF15153300	Film	0.015μF	±5%	
C151	1	1	EA47405030	Elect	0.47μF		50V
C152	1	1	DF15103300	Film	0.01μF	±5%	
C153	1	1	EA47405030	Elect	0.47μF		50V
C154	1	1	EA47602530	Elect	47μF		25V
C155	1	1	EA10505030	Elect	1μF		50V
C156	1	1	DF15152300	Film	1500pF	±5%	
C157	1	1	DF55271090	Film	270pF	±5%	
C158	1	1	DF55681090	Film	680pF	±5%	
C159	1	1	EA47405030	Elect	0.47μF		50V

REF. DESIG.	Q'TY U	Q'TY C	PART NO.	DESCRIPTION			
C160	1	1	EA10505030	Elect	1μF		50V
C161	1	1	EA47405030	Elect	0.47μF		50V
C162	1	1	DD15331370	Ceramic	330pF	±5%	
C163	1	1	EA10701630	Elect	100μF		16V
C164	1	1	DF65271010	Film	270pF	±5%	
C167	1	1	EA47601630	Elect	47μF		16V
C170	1	1	DK18104010	Ceramic	0.1μF		
C201	1	1	EE10601640	Elect	10μF		16V
C202	1	1	EA10602530	Elect	10μF		25V
C203	1	1	DD15510300	Ceramic	51pF	±5%	
C204	1	1	DD15510300	Ceramic	51pF	±5%	
C205	1	1	DD15330300	Ceramic	33pF	±5%	
C207	1	1	EA10505030	Elect	1μF		50V
C208	1	1	EA10701030	Elect	100μF		10V
C209	1	1	EA47602530	Elect	47μF		25V
C210	1	1	EA47405030	Elect	0.47μF		50V
C211	1	1	EA10505030	Elect	1μF		50V
C212	1	1	EA47602530	Elect	47μF		25V
C213	1	1	DF15392300	Film	3900pF	±5%	
C214	1	1	DF15152300	Film	1500pF	±5%	
C215	1	1	DF55681090	Film	680pF	±5%	
C216	1	1	EA10602530	Elect	10μF		25V
C217	1	1	EA47405030	Elect	0.47μF		50V
C218	1	1	DF15222300	Film	2200pF	±5%	
C219	1	1	EA47405030	Elect	0.47μF		50V
C220	1	1	EA47505030	Elect	4.7μF		50V
C221	1	1	DF15122300	Film	1200pF	±5%	
C222	1	1	EA47505030	Elect	4.7μF		50V
C223	1	1	EA22405030	Elect	0.22μF		50V
C224	1	1	EA10602530	Elect	10μF		25V
C225	1	1	DF15223300	Film	0.022μF	±5%	
C226	1	1	DF15473300	Film	0.047μF	±5%	
C227	1	1	DF15473300	Film	0.047μF	±5%	
C228	1	1	DF15333300	Film	0.033μF	±5%	
C230	1	1	DF15153300	Film	0.015μF	±5%	
C231	1	1	DF15223300	Film	0.022μF	±5%	
C232	1	1	DF15223300	Film	0.022μF	±5%	
C233	1	1	DF15273300	Film	0.027μF	±5%	
C234	1	1	DF15153300	Film	0.015μF	±5%	
C235	1	1	DF15393300	Film	0.039μF	±5%	
C236	1	1	DF15103300	Film	0.01μF	±5%	
C237	1	1	DF15682300	Film	6800pF	±5%	
C238	1	1	DF15822300	Film	0.0082μF	±5%	
C239	1	1	DF15822300	Film	8200pF	±5%	
C240	1	1	DF15103300	Film	0.01μF	±5%	
C241	1	1	EE10601640	Elect	10μF		16V
C242	1	1	DF55151090	Film	150pF	±5%	
C243	1	1	EA10602530	Elect	10μF		25V
C244	1	1	DD15510300	Ceramic	51pF	±5%	
C245	1	1	DD15330300	Ceramic	33pF	±5%	
C246	1	1	EA10701030	Elect	100μF		10V
C247	1	1	EA22505030	Elect	2.2μF		50V
C248	1	1	DF15123300	Film	0.012μF	±5%	
C249	1	1	EA10505030	Elect	1μF		50V
C250	1	1	DF15153300	Film	0.015μF	±5%	
C251	1	1	EA47405030	Elect	0.47μF		50V
C252	1	1	DF15103300	Film	0.01μF	±5%	
C253	1	1	EA47405030	Elect	0.47μF		50V
C254	1	1	EA47602530	Elect	47μF		25V
C255	1	1	EA10505030	Elect	1μF		50V
C256	1	1	DF15152300	Film	1500pF	±5%	
C257	1	1	DF55271090	Film	270pF	±5%	

• (U): for U.S.A.
• (C): for Canada

REF. DESIG.	Q'TY U	Q'TY C	PART NO.	DESCRIPTION
C258	1	1	DF55681090	Film 680pF ±5%
C259	1	1	EA47405030	Elect 0.47μF 50V
C260	1	1	EA10505030	Elect 1μF 50V
C261	1	1	EA47405030	Elect 0.47μF 50V
C262	1	1	DD15331370	Elect 330pF ±5%
C263	1	1	EA10701630	Elect 100μF 16V
C264	1	1	DF65271010	Film 270pF ±5%
C267	1	1	EA47601630	Elect 47μF 16V
C270	1	1	DK18104010	Ceramic 0.1μF
C301	1	1	EA10602530	Elect 10μF 25V
C302	1	1	EA10405030	Elect 0.1μF 50V
				PK11-RESISTORS
				(All Resistors are ±5% and ¼W)
R101	1	1	GD05822140	8.2KΩ
R102	1	1	RN05224140	220KΩ
R103	1	1	GD05221140	220Ω
R104	1	1	GD05823140	82KΩ
R105	1	1	GD05104140	100KΩ
R106	1	1	GD05103140	10KΩ
R107	1	1	GD05271140	270Ω
R108	1	1	GD05821140	820Ω
R109	1	1	GD05153140	15KΩ
R110	1	1	GD05152140	1.5KΩ
R111	1	1	GD05472140	4.7KΩ
R112	1	1	GD05105140	1MΩ
R113	1	1	GD05182140	1.8KΩ
R114	1	1	GD05471140	470Ω
R115	1	1	GG05152140	1.5KΩ
⚠ R116	1	1	GG05101140	100Ω
R117	1	1	GD05562140	5.6KΩ
R118	1	1	GD05562140	5.6KΩ
R119	1	1	GD05562140	5.6KΩ
R120	1	1	GD05472140	4.7KΩ
R121	1	1	GD05133140	13KΩ
R122	1	1	GD05103140	10KΩ
R123	1	1	RA02030060	20KΩTrimming, Rec. Level Adj.
R124	1	1	RA02030060	20KΩTrimming, Rec. Level Adj.
R125	1	1	GD05105140	1MΩ
R126	1	1	GD05332140	3.3KΩ
R127	1	1	GD05332140	3.3KΩ
R128	1	1	GD05123140	12KΩ
R129	1	1	GD05105140	1MΩ
R130	1	1	GD05332140	3.3KΩ
R131	1	1	GD05102140	1KΩ
R132	1	1	GD05822140	8.2KΩ
R133	1	1	GD05104140	100KΩ
R134	1	1	GD05123140	12KΩ
R135	1	1	GD05334140	330KΩ
R136	1	1	GD05823140	82KΩ
R137	1	1	GD05472140	4.7KΩ
R138	1	1	GD05102140	1KΩ
R139	1	1	GD05561140	560Ω
R140	1	1	GD05101140	100Ω
R141	1	1	GD05560140	56Ω
R142	1	1	GD05222140	2.2KΩ
R143	1	1	GD05332140	3.3KΩ
R145	1	1	GD05220140	22Ω
R146	1	1	GD05560140	56Ω
R147	1	1	GD05121140	120Ω
R148	1	1	GD05820140	82Ω

REF. DESIG.	Q'TY U	Q'TY C	PART NO.	DESCRIPTION
R149	1	1	GD05820140	82Ω
R150	1	1	GD05220140	22Ω
R151	1	1	GD05561140	560Ω
R152	1	1	GD05821140	820Ω
R153	1	1	GD05330140	33Ω
R154	1	1	GD05821140	820Ω
R155	1	1	GD05221140	220Ω
R156	1	1	GD05471140	470Ω
R157	1	1	GD05102140	1KΩ
R158	1	1	GD05102140	1KΩ
R160	1	1	GD05563140	56KΩ
R161	1	1	RN05224140	220KΩ
R162	1	1	GD05151140	150Ω
R163	1	1	GD05823140	82KΩ
R164	1	1	GD05104140	100KΩ
R165	1	1	GD05103140	10KΩ
R166	1	1	GD05271140	270Ω
R167	1	1	GD05561140	560Ω
R168	1	1	RA01030260	10KΩTrim., Playback EQ. Adj.
R169	1	1	GD05682140	6.8KΩ
R170	1	1	GD05334140	330KΩ
R171	1	1	GD05562140	5.6KΩ
R172	1	1	GD05222140	2.2KΩ
R173	1	1	GD05102140	1KΩ
R174	1	1	GD05682140	6.8KΩ
R175	1	1	GD05102140	1KΩ
R176	1	1	RA05030090	50KΩTrim., Playback Level Adj.
R177	1	1	GG05152140	1.5KΩ
R178	1	1	GD05102140	1KΩ
⚠ R179	1	1	GG05101140	100Ω
R180	1	1	GD05105140	1MΩ
R181	1	1	GD05182140	1.8KΩ
R182	1	1	GD05102140	1KΩ
R183	1	1	GD05122140	1.2KΩ
R184	1	1	GD05333140	33KΩ
R185	1	1	GD05104140	100KΩ
R186	1	1	GA05681010	680Ω 1W
R187	1	1	GD05102140	1KΩ
R188	1	1	GD05151140	150Ω
R189	1	1	GD05102140	1KΩ
R191	1	1	GD05472140	4.7KΩ
R201	1	1	GD05822140	8.2KΩ
R202	1	1	RN05224140	220KΩ
R203	1	1	GD05221140	220Ω
R204	1	1	GD05823140	82KΩ
R205	1	1	GD05104140	100KΩ
R206	1	1	GD05103140	10KΩ
R207	1	1	GD05271140	270Ω
R208	1	1	GD05821140	820Ω
R209	1	1	GD05153140	15KΩ
R210	1	1	GD05152140	1.5KΩ
R211	1	1	GD05472140	4.7KΩ
R212	1	1	GD05105140	1MΩ
R213	1	1	GD05182140	1.8KΩ
R214	1	1	GD05471140	470Ω
R215	1	1	GG05152140	1.5KΩ
⚠ R216	1	1	GG05101140	100Ω
R217	1	1	GD05562140	5.6KΩ
R218	1	1	GD05562140	5.6KΩ
R219	1	1	GD05562140	5.6KΩ
R220	1	1	GD05472140	4.7KΩ

• (U): for U.S.A.
• (C): for Canada

REF. DESIG.	Q'TY U	Q'TY C	PART NO.	DESCRIPTION
R221	1	1	GD05133140	13KΩ
R222	1	1	GD05103140	10KΩ
R223	1	1	RA02030060	20KΩTrimming, Rec. Level Adj.
R224	1	1	RA02030060	20KΩTrimming, Rec. Level Adj.
R225	1	1	GD05105140	1MΩ
R226	1	1	GD05332140	3.3KΩ
R227	1	1	GD05332140	3.3KΩ
R228	1	1	GD05123140	12KΩ
R229	1	1	GD05105140	1MΩ
R230	1	1	GD05332140	3.3KΩ
R231	1	1	GD05102140	1KΩ
R232	1	1	GD05822140	8.2KΩ
R233	1	1	GD05104140	100KΩ
R234	1	1	GD05123140	12KΩ
R235	1	1	GD05334140	330KΩ
R236	1	1	GD05823140	82KΩ
R237	1	1	GD05472140	4.7KΩ
R238	1	1	GD05102140	1KΩ
R239	1	1	GD05561140	560Ω
R240	1	1	GD05101140	100Ω
R241	1	1	GD05560140	56Ω
R242	1	1	GD05222140	2.2KΩ
R243	1	1	GD05332140	3.3KΩ
R245	1	1	GD05220140	22Ω
R246	1	1	GD05560140	56Ω
R247	1	1	GD05121140	120Ω
R248	1	1	GD05820140	82Ω
R249	1	1	GD05820140	82Ω
R250	1	1	GD05220140	22Ω
R251	1	1	GD05561140	560Ω
R252	1	1	GD05820140	82Ω
R253	1	1	GD05330140	33Ω
R254	1	1	GD05821140	820Ω
R255	1	1	GD05221140	220Ω
R256	1	1	GD05471140	470Ω
R257	1	1	GD05102140	1KΩ
R258	1	1	GD05102140	1KΩ
R260	1	1	GD05563140	56KΩ
R261	1	1	RN05224140	220KΩ
R262	1	1	GD05151140	150Ω
R263	1	1	GD05823140	82KΩ
R264	1	1	GD05104140	100KΩ
R265	1	1	GD05103140	10KΩ
R266	1	1	GD05271140	270Ω
R267	1	1	GD05561140	560Ω
R268	1	1	RA01030260	10KΩTrim., Playback EQ. Adj.
R269	1	1	GD05682140	6.8KΩ
R270	1	1	GD05334140	330KΩ
R271	1	1	GD05562140	5.6KΩ
R272	1	1	GD05222140	2.2KΩ
R273	1	1	GD05102140	1KΩ
R274	1	1	GD05682140	6.8KΩ
R275	1	1	GD05102140	1KΩ
R276	1	1	RA05030090	50KΩTrim., Playback Level Adj.
R277	1	1	GG05152140	1.5KΩ
R278	1	1	GD05102140	1KΩ
⚠ R279	1	1	GG05101140	100Ω
R280	1	1	GD05105140	1MΩ
R281	1	1	GD05182140	1.8KΩ
R282	1	1	GD05102140	1KΩ

REF. DESIG.	Q'TY U	Q'TY C	PART NO.	DESCRIPTION
R283	1	1	GD05122140	1.2KΩ
R284	1	1	GD05333140	33KΩ
R285	1	1	GD05104140	100KΩ
R286	1	1	GA05681010	680Ω
R287	1	1	GD05102140	1KΩ
R288	1	1	GD05151140	150Ω
R289	1	1	GD05102140	1KΩ
R291	1	1	GD05472140	4.7KΩ
R301	1	1	GD05472140	4.7KΩ
R304	1	1	GD05103140	10KΩ
R305	1	1	GD05103140	10KΩ
R306	1	1	GD05223140	22KΩ
R307	1	1	RK02020070	2KΩVariable, Bias Fine
R308	1	1	GD05332140	3.3KΩ
R310	1	1	GD05102140	1KΩ
R311	1	1	GD05123140	12KΩ
R312	1	1	GD05222140	2.2KΩ
R313	1	1	GD05393140	39KΩ
R314	1	1	RA01030260	10KΩTrim., CrO_2 Bias Adj.
R315	1	1	GD05152140	1.5KΩ
R316	1	1	RA05030090	50KΩTrim., FeCr Bias Adj.
R317	1	1	GD05182140	1.8KΩ
R318	1	1	RA05020160	5KΩTrim., Metal Bias Adj.
R319	1	1	GD05561140	560Ω
R320	1	1	GD05102140	1KΩ
⚠ R321	1	1	GA05151010	150Ω 1W
R322	1	1	GD05393140	39KΩ
R323	1	1	GD05123140	12KΩ
R324	1	1	GD05103140	10KΩ
R325	1	1	GD05331140	330Ω
R326	1	1	GD05122140	1.2KΩ
R327	1	1	RA01020110	1KΩTrim., High-Speed Adj.
R328	1	1	GD05822140	8.2KΩ
R329	1	1	GD05103140	10KΩ
R330	1	1	GD05103140	10KΩ
				PK11-SEMICONDUCTORS
Q101	1	1	HT314001E0	Transistor 2SC1400(E)
Q102	1	1	HT314001E0	Transistor 2SC1400(E)
Q103	1	1	HT314001E0	Transistor 2SC1400(E)
Q104	1	1	HT309451P0	Transistor 2SC945(P)
Q105	1	1	HT314001E0	Transistor 2SC1400(E)
Q106	1	1	HT314001E0	Transistor 2SC1400(E)
Q107	1	1	HT320011K0	Transistor 2SC2001(K)
Q108	1	1	HT314001E0	Transistor 2SC1400(E)
Q109	1	1	HT309451P0	Transistor 2SC945(P)
Q110	1	1	HT309451P0	Transistor 2SC945(P)
Q112	1	1	HT314001E0	Transistor 2SC1400(E)
Q113	1	1	HT314001E0	Transistor 2SC1400(E)
Q114	1	1	HT309451P0	Transistor 2SC945(P)
Q115	1	1	HT309451P0	Transistor 2SC945(P)
Q116	1	1	HT309451P0	Transistor 2SC945(P)
Q117	1	1	HT314001E0	Transistor 2SC1400(E)
Q118	1	1	HT309451P0	Transistor 2SC945(P)
Q119	1	1	HT309451P0	Transistor 2SC945(P)
⚠ Q120	1	1	HD30030090	Zener WZ177
⚠ Q121	1	1	HD30030090	Zener WZ177
Q201	1	1	HT314001E0	Transistor 2SC1400(E)
Q202	1	1	HT314001E0	Transistor 2SC1400(E)
Q203	1	1	HT314001E0	Transistor 2SC1400(E)
Q204	1	1	HT309451P0	Transistor 2SC945(P)
Q205	1	1	HT314001E0	Transistor 2SC1400(E)
Q206	1	1	HT314001E0	Transistor 2SC1400(E)

• (U): for U.S.A.
• (C): for Canada

REF. DESIG.	Q'TY U	Q'TY C	PART NO.	DESCRIPTION
Q207	1	1	HT320011K0	Transistor 2SC2001(K)
Q208	1	1	HT314001E0	Transistor 2SC1400(E)
Q209	1	1	HT309451P0	Transistor 2SC945(P)
Q210	1	1	HT309451P0	Transistor 2SC945(P)
Q212	1	1	HT314001E0	Transistor 2SC1400(E)
Q213	1	1	HT314001E0	Transistor 2SC1400(E)
Q214	1	1	HT309451P0	Transistor 2SC945(P)
Q215	1	1	HT309451P0	Transistor 2SC945(P)
Q216	1	1	HT309451P0	Transistor 2SC945(P)
Q217	1	1	HT314001E0	Transistor 2SC1400(E)
Q218	1	1	HT309451P0	Transistor 2SC945(P)
Q219	1	1	HT309451P0	Transistor 2SC945(P)
⚠ Q220	1	1	HD30030090	Zener WZ177
⚠ Q221	1	1	HD30030090	Zener WZ177
Q301	1	1	HD20011050	Diode 1S1555
Q302	1	1	HD20011050	Diode 1S1555
Q303	1	1	HT309451P0	Transistor 2SC945(P)
Q304	1	1	HT309451P0	Transistor 2SC945(P)
⚠ Q305	1	1	HT403131E0	Transistor 2SD313(E)
Q306	1	1	HT309451P0	Transistor 2SC945(P)
Q307	1	1	HD30033090	Zener WZ-052
Q308	1	1	HD30057090	Zener YZ-052C
Q309	1	1	HT309451P0	Transistor 2SC945(P)
				PK11-MISCELLANEOUS
L101	1	1	LS70305010	M.P.X. Coil 19KHz
L102	1	1	LC24750030	Choke Coil 4.7mH
L103	1	1	LC24750030	Choke Coil 4.7mH
L104	1	1	LC22260060	Choke Coil 22mH
L105	1	1	LC22260010	Choke Coil 22mH
L201	1	1	LS70305010	M.P.X. Coil 19KHz
L202	1	1	LC24750030	Choke Coil 4.7mH
L203	1	1	LC24750030	Choke Coil 4.7mH
L204	1	1	LC22260060	Choke Coil 22mH
L205	1	1	LC22260010	Choke Coil 22mH
S301	1	1	SP10040030	Push Switch, Normal
S302	1	1	SP10040030	Push Switch, CrO_2
S303	1	1	SP10040030	Push Switch, FeCr
S304	1	1	SP10040030	Push Switch, Metal
S305	1	1	SR12020020	Rotary Switch, Speed Selector
S306	1	1	SS04030130	Slide Switch, MPX/Dolby
S307	1	1	SB11910010	Switch Band, Flx
S308	1	1	SC00030030	Switch, 3 Position
S309	1	1	SS04020420	Slide Switch, Monitor
S310	1	1	SB11910020	Switch Band, Flx
S311	1	1	SC00020030	Switch, 2 Position
P205	1	1	YJ06001430	Jack, (9P)
P206	1	1	YP06001040	Plug, (3P)
J101	47	47	YP10001130	Plug, Wire Wrap
J303	1	1	YT02040260	Terminal, (4P) RCA
				PK12-MIC LINE VOLUME CIRCUIT BOARD
PK12	1	1	YK42801320	P.W. Board, Mic Line Vol.
	1	1	ZZ42801320	P.W. Board Assembly
				PK12-RESISTORS
R391	1	1	RD05030110	50KΩ(A) Variable, Mic Vol.
R392	1	1	RD05030110	50KΩ(A) Variable, Mic Vol.
R393	1	1	RD01040100	100KΩ(A) Variable, Line Vol.
R394	1	1	RD01040100	100KΩ(A) Variable, Line Vol.
R395	1	1	GD05223140	22KΩ ±5% ¼W
R396	1	1	GD05223140	22KΩ ±5% ¼W

REF. DESIG.	Q'TY U	Q'TY C	PART NO.	DESCRIPTION
				PK13-OUTPUT VOLUME CIRCUIT BOARD
PK13	1	1	YK42801330	P.W. Board, Output Volume
	1	1	ZZ42801330	P.W. Board Assembly
				PK13-RESISTORS
R381	1	1	RM05030830	50KΩ(A) Variable, Output
R382	1	1	RM05030830	50KΩ(A) Variable, Output
				PK21-COMPUTER CIRCUIT BOARD
PK21	1	1	YK42792710	P.W. Board, Computer
	1	1	ZZ42792710	P.W. Board Assembly
				PK21-CAPACITORS
C501	1	1	DF15332300	Film 3300pF ±5%
C502	1	1	EA33505030	Elect 3.3μF 50V
C503	1	1	EA22601630	Elect 22μF 16V
C504	1	1	EA10505030	Elect 1μF 50V
C505	1	1	EA47505030	Elect 4.7μF 50V
C506	1	1	EA10505030	Elect 1μF 50V
C507	1	1	DF15562350	Film 0.0056μF ±5%
C508	1	1	EA47505030	Elect 4.7μF 50V
C509	1	1	DF15102350	Film 0.001μF ±5%
C510	1	1	EA10505030	Elect 1μF 50V
C511	1	1	EA47505030	Elect 4.7μF 50V
C512	1	1	EA10405030	Elect 0.1μF 50V
C513	1	1	EA47502530	Elect 4.7μF 25V
C514	1	1	EA22602530	Elect 22μF 25V
C515	1	1	EA22602530	Elect 22μF 25V
C516	1	1	EA22601630	Elect 22μF 16V
C517	1	1	EA10602530	Elect 10μF 25V
C518	1	1	DF15472300	Film 0.0047μF ±5%
C519	1	1	DD15330370	Ceramic 33pF ±5%
C520	1	1	EA22702530	Elect 220μF 25V
C521	1	1	EA22505030	Elect 2.2μF 50V
C522	1	1	EA22505030	Elect 2.2μF 50V
C523	1	1	EA33602530	Elect 33μF 25V
C524	1	1	EA10602530	Elect 10μF 25V
C525	1	1	EA10701630	Elect 100μF 16V
C526	1	1	DK18103320	Ceramic 0.01μF
C527	1	1	DD15330370	Ceramic 33pF ±5%
C528	1	1	DK18103320	Ceramic 0.01μF
C529	1	1	EA47405030	Elect 0.47μF 50V
C530	1	1	EA22702530	Elect 220μF 25V
C531	1	1	EA22601630	Elect 22μF 16V
C601	1	1	EA22505030	Elect 2.2μF 50V
C602	1	1	EA10602530	Elect 10μF 25V
C603	1	1	DD15470370	Ceramic 47pF ±5%
C604	1	1	EA10505030	Elect 1μF 50V
C605	1	1	EA10505030	Elect 1μF 50V
C606	1	1	DF15103350	Film 0.01μF 50V
C607	1	1	DF15103300	Film 0.01μF ±5%
C608	1	1	DF15333350	Film 0.033μF 50V
C609	1	1	DD15470370	Ceramic 47pF ±5%
C610	1	1	DD15470370	Ceramic 47pF ±5%
C611	1	1	DD15561370	Ceramic 560pF
C612	1	1	DF15682350	Film 0.0068μF 50V
C621	1	1	EA22505030	Elect 2.2μF 50V
C622	1	1	EA10602530	Elect 10μF 25V
C623	1	1	DD15470370	Ceramic 47pF ±5%
C624	1	1	EA10505030	Elect 1μF 50V
C625	1	1	EA10505030	Elect 1μF 50V
C532	1	1	DK16103300	Ceramic 0.01μF 50V
C533	1	1	DK18104010	Ceramic 0.1μF
C534	1	1	DK18104010	Ceramic 0.1μF 50V
C535	1	1	EA10405030	Elect 0.1μF 50V

• (U): for U.S.A.
• (C): for Canada

REF. DESIG.	Q'TY U	Q'TY C	PART NO.	DESCRIPTION
C626	1	1	DF15103350	Film 0.01μF ±5%
C627	1	1	DF15103300	Film 0.01μF ±5%
C628	1	1	DF15103300	Film 0.01μF ±5%
C629	1	1	DF15332300	Film 3300pF ±5%
C641	1	1	EA33602530	Elect 33μF 25V
				PK21-RESISTORS
				(All Resistors are ±5% and ¼W)
R503	1	1	GD05333140	33KΩ
R504	1	1	GD95823140	82KΩ
R506	1	1	GD05562140	5.6KΩ
R507	1	1	GD05184140	180KΩ
R508	1	1	GD05103140	10KΩ
R509	1	1	GD05562140	5.6KΩ
R510	1	1	GD05221140	220Ω
R511	1	1	GD05184140	180KΩ
R512	1	1	GD05103140	10KΩ
R513	1	1	GD05562140	5.6KΩ
R514	1	1	GD05221140	220Ω
R515	1	1	GD05104140	100KΩ
R516	1	1	GD05103140	10KΩ
R517	1	1	GD05152140	1.5KΩ
R518	1	1	GD05201140	200Ω
R519	1	1	RA01030260	10KΩTrim., Gain Cont.
R520	1	1	GD05333140	33KΩ
R521	1	1	GD05222140	2.2KΩ
R522	1	1	GD05122140	1.2KΩ
R523	1	1	GD05102140	1KΩ
R524	1	1	GD05562140	5.6KΩ
R525	1	1	GD05152140	1.5KΩ
R526	1	1	GD05473140	47KΩ
R527	1	1	GD05100140	10Ω
R528	1	1	GD05222140	2.2KΩ
R529	1	1	GD05472140	4.7KΩ
R530	1	1	GD05272140	2.7KΩ
R531	1	1	GD05103140	10KΩ
R532	1	1	GD05103140	10KΩ
R533	1	1	GD05472140	4.7KΩ
R534	1	1	GD05472140	4.7KΩ
R535	1	1	GD05330140	33Ω
R536	1	1	GD05103140	10KΩ
R537	1	1	GD05103140	10KΩ
R538	1	1	GD05104140	100KΩ
R539	1	1	GD05104140	100KΩ
R540	1	1	GD05272140	2.7KΩ
R541	1	1	GD05682140	6.8KΩ
R542	1	1	GD05682140	6.8KΩ
R543	1	1	GD05103140	10KΩ
R544	1	1	GD05821140	820Ω
R545	1	1	GD05681140	680Ω
R546	1	1	GD05821140	820Ω
R547	1	1	GD05103140	10KΩ
R548	1	1	GD05103140	10KΩ
R549	1	1	GD05123140	12KΩ
R550	1	1	GD05472140	4.7KΩ
R551	1	1	GD05101140	100Ω
R552	1	1	GD05822140	8.2KΩ
R553	1	1	GD05272140	2.7KΩ
R554	1	1	GD05103140	10KΩ
R555	1	1	GD05472140	4.7KΩ
R556	1	1	GD05472140	4.7KΩ
R501	1	1	GD05104140	100KΩ
R502	1	1	GD05102140	1KΩ

REF. DESIG.	Q'TY U	Q'TY C	PART NO.	DESCRIPTION
R557	1	1	GD05330140	33Ω
R558	1	1	GD05103140	10KΩ
R559	1	1	GD05682140	6.8KΩ
R560	1	1	GD05103140	10KΩ
R561	1	1	GD05103140	10KΩ
R562	1	1	GD05102140	1KΩ
R563	1	1	GD05103140	10KΩ
R564	1	1	GD05821140	820Ω
R565	1	1	GD05103140	10KΩ
R566	1	1	GD05103140	10KΩ
R567	1	1	GG05102120	1KΩ ½W
R568	1	1	GD05331140	330Ω
R569	1	1	GD05272140	2.7KΩ
R570	1	1	GD05272140	2.7KΩ
R571	1	1	GD05820140	82Ω
R572	1	1	GD05121140	120Ω
R573	1	1	GD05121140	120Ω
R574	1	1	GD05121140	120Ω
R575	1	1	GD05121140	120Ω
R576	1	1	GD05121140	120Ω
R577	1	1	GD05121140	120Ω
R578	1	1	GD05121140	120Ω
R579	1	1	GD05103140	10KΩ
R580	1	1	GD05681140	680Ω
R581	1	1	GD05142140	1.5KΩ
R582	1	1	GD05152140	1.5KΩ
R583	1	1	GD05152140	1.5KΩ
R584	1	1	GD05152140	1.5KΩ
R585	1	1	GD05152140	1.5KΩ
R586	1	1	GD05152140	1.5KΩ
R587	1	1	GD05332140	3.3KΩ
R588	1	1	GD05332140	3.3KΩ
R589	1	1	GD05103140	10KΩ
R590	1	1	GD05103140	10KΩ
R591	1	1	GD05103140	10KΩ
R592	1	1	GD05103140	10KΩ
R593	1	1	GD05103140	10KΩ
R594	1	1	GD05103140	10KΩ
R595	1	1	GD05103140	10KΩ
R596	1	1	GD05562140	5.6KΩ
R597	1	1	GD05182140	1.8KΩ
R598	1	1	GD05104140	100KΩ
R599	1	1	GD05152140	1.5KΩ
R601	1	1	GD05103140	10KΩ
R602	1	1	RA03020030	3KΩTrimming
R603	1	1	GD05392140	3.9KΩ
R604	1	1	GD05123140	12KΩ
R605	1	1	GA05681010	680Ω 1W
R606	1	1	GD05104140	100KΩ
R607	1	1	GD05102140	1KΩ
R608	1	1	GD05562140	5.6KΩ
R609	1	1	GD05105140	1MΩ
R610	1	1	RA05030090	50KΩTrimming
R611	1	1	GD05224140	220KΩ
R612	1	1	GD05473140	47KΩ
R613	1	1	GD05272140	2.7KΩ
R614	1	1	GD05122140	1.2KΩ
R615	1	1	RA05030090	50KΩTrimming
R616	1	1	GD05273140	27KΩ
R617	1	1	GD05151140	150Ω
R731	1	1	GG05330140	33Ω
R732	1	1	GG05101140	100Ω

• (U): for U.S.A.
• (C): for Canada

REF. DESIG.	Q'TY U	Q'TY C	PART NO.	DESCRIPTION
R618	1	1	GD05124140	120KΩ
R619	1	1	GD05472140	4.7KΩ
R620	1	1	GD05561140	560Ω
R621	1	1	GD05103140	10KΩ
R622	1	1	RA03020030	3KΩTrimming
R623	1	1	GD05392140	3.9KΩ
R624	1	1	GD05123140	12KΩ
R625	1	1	GA05681010	680Ω 1W
R626	1	1	GD05104140	100KΩ
R627	1	1	GD05102140	1KΩ
R628	1	1	GD05562140	5.6KΩ
R629	1	1	GD05105140	1MΩ
R630	1	1	RA05030090	50KΩTrimming
R631	1	1	GD05224140	220KΩ
R632	1	1	GD05473140	47KΩ
R633	1	1	GD05272140	2.7KΩ
R634	1	1	GD05122140	1.2KΩ
R642	1	1	GG05821140	820Ω
R643	1	1	GD05562140	5.6KΩ
R644	1	1	GA05181010	180Ω 1W
R645	1	1	GD05473140	47KΩ
R646	1	1	GD05123140	12KΩ
R647	1	1	GD05123140	12KΩ
R648	1	1	GD05822140	8.2KΩ
R649	1	1	GD05822140	8.2KΩ
R691	1	1	GD05562140	5.6KΩ
R692	1	1	GD05472140	4.7KΩ
R693	1	1	GD05472140	4.7KΩ
R694	1	1	GD05683140	68KΩ
R695	1	1	GD05223140	22KΩ
R696	1	1	GD05472140	4.7KΩ
R697	1	1	GD05562140	5.2KΩ
R701	1	1	GD05473140	47KΩ
R702	1	1	GD05473140	47KΩ
R703	1	1	GD05473140	47KΩ
R704	1	1	GD05473140	47KΩ
R705	1	1	GD05473140	47KΩ
R706	1	1	GD05473140	47KΩ
R707	1	1	GD05473140	47KΩ
R708	1	1	GD05473140	47KΩ
R709	1	1	GD05103140	10KΩ
R710	1	1	GD05103140	10KΩ
R711	1	1	GD05103140	10KΩ
R712	1	1	GD05103140	10KΩ
R713	1	1	GD05103140	10KΩ
R714	1	1	GD05103140	10KΩ
R715	1	1	GD05103140	10KΩ
				PK21-SEMICONDUCTORS
Q501	1	1	HT326341T0	Transistor 2SC2634(T)
Q502	1	1	HT326341S0	Transistor 2SC2634(S)
Q503	1	1	HT326341S0	Transistor 2SC2634(S)
Q504	1	1	HT326341S0	Transistor 2SC2634(S)
Q505	1	1	HT326341S0	Transistor 2SC2634(S)
Q506	1	1	HT326341T0	Transistor 2SC2634(T)
Q507	1	1	HT326341S0	Transistor 2SC2634(S)
Q508	1	1	HT326341T0	Transistor 2SC2634(T)
Q509	1	1	HT326341T0	Transistor 2SC2634(T)
Q510	1	1	HT326341S0	Transistor 2SC2634(S)
Q511	1	1	HT326341S0	Transistor 2SC2634(S)
Q512	1	1	HT326341S0	Transistor 2SC2634(S)
Q513	1	1	HT326341S0	Transistor 2SC2634(S)
Q514	1	1	HT320601R0	Transistor 2SC2060(R)
Q515	1	1	HT326341S0	Transistor 2SC2634(S)
Q516	1	1	HT326341S0	Transistor 2SC2634(S)
Q517	1	1	HT326341S0	Transistor 2SC2634(S)
Q518	1	1	HD20011050	Diode 1S1555
Q522	1	1	HT326341S0	Transistor 2SC2634(S)
Q523	1	1	HT326341S0	Transistor 2SC2634(S)

REF. DESIG.	Q'TY U	Q'TY C	PART NO.	DESCRIPTION
Q524	1	1	HT326341S0	Transistor 2SC2634(S)
Q525	1	1	HT320601R0	Transistor 2SC2060(R)
Q526	1	1	HT326341S0	Transistor 2SC2634(S)
Q527	1	1	HT320601R0	Transistor 2SC2060(R)
Q528	1	1	HT326341S0	Transistor 2SC2634(S)
Q529	1	1	HT320601R0	Transistor 2SC2060(R)
Q530	1	1	HT326341S0	Transistor 2SC2634(S)
Q531	1	1	HT320601R0	Transistor 2SC2060(R)
Q532	1	1	HT326341S0	Transistor 2SC2634(S)
Q533	1	1	HT326341S0	Transistor 2SC2634(S)
Q534	1	1	HT326341S0	Transistor 2SC2634(S)
Q535	1	1	HT326341S0	Transistor 2SC2634(S)
Q536	1	1	HT326341S0	Transistor 2SC2634(S)
Q537	1	1	HT326341S0	Transistor 2SC2634(S)
Q538	1	1	HT326341S0	Transistor 2SC2634(S)
Q539	1	1	HT326341S0	Transistor 2SC2634(S)
Q540	1	1	HT326341S0	Transistor 2SC2634(S)
Q541	1	1	HT326341S0	Transistor 2SC2634(S)
Q542	1	1	HT326341S0	Transistor 2SC2634(S)
Q543	1	1	HT326341S0	Transistor 2SC2634(S)
Q544	1	1	HT326341S0	Transistor 2SC2634(S)
Q545	1	1	HT326341T0	Transistor 2SC2634(T)
Q546	1	1	HT326341T0	Transistor 2SC2634(T)
Q547	1	1	HT326341S0	Transistor 2SC2634(S)
Q548	1	1	HT326341S0	Transistor 2SC2634(S)
Q549	1	1	HT326341S0	Transistor 2SC2634(S)
Q550	1	1	HD20011050	Diode 1S1555
Q551	1	1	HD20011050	Diode 1S1555
Q552	1	1	HD20011050	Diode 1S1555
Q553	1	1	HD20011050	Diode 1S1555
Q554	1	1	HD20011050	Diode 1S1555
Q555	1	1	HD20011050	Diode 1S1555
Q556	1	1	HD20011050	Diode 1S1555
Q557	1	1	HD10001010	Diode 1N34A
Q558	1	1	HD10001010	Diode 1N34A
Q559	1	1	HD20011050	Diode 1S1555
Q560	1	1	HD20011050	Diode 1S1555
Q561	1	1	HD30013060	Zener RD11EB3
Q562	1	1	HD30014060	Zener RD24EB2
Q563	1	1	HD20011050	Diode 1S1555
Q564	1	1	HD20011050	Diode 1S1555
Q565	1	1	HD20011050	Diode 1S1555
Q566	1	1	HD20011050	Diode 1S1555
Q567	1	1	HD20011050	Diode 1S1555
Q568	1	1	HD20011050	Diode 1S1555
Q569	1	1	HD20011050	Diode 1S1555
Q570	1	1	HD20011050	Diode 1S1555
Q571	1	1	HD20011050	Diode 1S1555
Q572	1	1	HD20011050	Diode 1S1555
Q573	1	1	HD20011050	Diode 1S1555
Q574	1	1	HD20011050	Diode 1S1555
Q575	1	1	HD20011050	Diode 1S1555
Q576	1	1	HD20011050	Diode 1S1555
Q577	1	1	HD20011050	Diode 1S1555
Q578	1	1	HD20011050	Diode 1S1555
Q579	1	1	HD20011050	Diode 1S1555
Q580	1	1	HD20011050	Diode 1S1555
Q581	1	1	HD20011050	Diode 1S1555
Q582	1	1	HD20011050	Diode 1S1555

• (U): for U.S.A.
• (C): for Canada

REF. DESIG.	Q'TY U	Q'TY C	PART NO.	DESCRIPTION
Q584	1	1	HD20011050	Diode 1S1555
Q586	1	1	HD20011050	Diode 1S1555
Q587	1	1	HD20011050	Diode 1S1555
Q588	1	1	HD20011050	Diode 1S1555
Q589	1	1	HD20011050	Diode 1S1555
Q590	1	1	HD20011050	Diode 1S1555
Q591	1	1	HD20011050	Diode 1S1555
Q594	1	1	HD20011050	Diode 1S1555
Q595	1	1	HD20011050	Diode 1S1555
Q596	1	1	HD20011050	Diode 1S1555
Q597	1	1	HD20011050	Diode 1S1555
Q598	1	1	HD20011050	Diode 1S1555
Q599	1	1	HD20011050	Diode 1S1555
Q600	1	1	HD20011050	Diode 1S1555
Q601	1	1	HT326341S0	Transistor 2SC2634(S)
Q602	1	1	HD326341S0	Transistor 2SC2634(S)
Q603	1	1	HD10001010	Diode 1N34A
Q604	1	1	HD10001010	Diode 1N34A
Q605	1	1	HD30031090	Zener WZ081
Q606	1	1	HT326341S0	Transistor 2SC2634(S)
Q607	1	1	HT326341S0	Transistor 2SC2634(S)
Q608	1	1	HT326341S0	Transistor 2SC2634(S)
Q621	1	1	HT326341S0	Transistor 2SC2634(S)
Q622	1	1	HT326341S0	Transistor 2SC2634(S)
Q623	1	1	HD10001010	Diode 1N34A
Q624	1	1	HD10001010	Diode 1N34A
Q625	1	1	HD30031090	Zener WZ081
Q626	1	1	HT326341S0	Transistor 2SC2634(S)
Q642	1	1	HT403131E0	Transistor 2SD313(E)
Q643	1	1	HT326341S0	Transitor 2SC2634(S)
Q644	1	1	HD30033090	Zener WZ052
Q645	1	1	HT309451P0	Transistor 2SC945(P)
Q646	1	1	HT309451P0	Transistor 2SC945(P)
Q647	1	1	HD10011050	Diode 1S1555
Q648	1	1	HD10011050	Diode 1S1555
Q701	1	1	HC10027060	IC μPD546C
Q702	1	1	HC10016060	IC μPA57C
Q703	1	1	HC10016060	IC μPA57C
				PK21-MISCELLANEOUS
L501	1	1	LI10015010	I.F.T. Coil
P501	1	1	YP06001070	Plug, (9P)
P502	1	1	YP06001060	Plug, (7P)
P503	1	1	YP06001050	Plug, (5P)
P504	1	1	YP06001050	Plug, (5P)
P505	1	1	YP06001070	Plug, (9P)
P506	1	1	YP06001740	Plug, (8P)
P507	1	1	YP06001750	Plug, (10P)
P508	1	1	YP06001750	Plug, (10P)
P509	1	1	TP06001050	Plug, (5P)
P621	1	1	YJ06002280	Jack, (12P)
P622	1	1	YJ06002270	Jack, (8P)
J601	1	1	YL01070080	Terminal (7P)
				PK22-DIGITAL & METER LED CIRCUIT BOARD
PK22	1	1	YK42792720	P.W. Board, Digital & Meter LED
	1	1	ZZ42792720	P.W. Board Assembly
				PK22-RESISTORS (All Resistors are ±5% and ¼W)
R651	1	1	GD05221140	220Ω
R652	1	1	GD05221140	220Ω
R653	1	1	GD05221140	220Ω
R654	1	1	GD05221140	220Ω
R655	1	1	GD05221140	220Ω
R656	1	1	GD05221140	220Ω
R657	1	1	GD05221140	220Ω
R658	1	1	GD05221140	220Ω

REF. DESIG.	Q'TY U	Q'TY C	PART NO.	DESCRIPTION
R659	1	1	GD05471140	470Ω
R660	1	1	GD05471140	470Ω
R661	1	1	GD05471140	470Ω
R662	1	1	GD05471140	470Ω
R671	1	1	GD05221140	220Ω
R672	1	1	GD05221140	220Ω
R673	1	1	GD05221140	220Ω
R674	1	1	GD05221140	220Ω
R675	1	1	GD05221140	220Ω
R676	1	1	GD05221140	220Ω
R677	1	1	GD05221140	220Ω
R678	1	1	GD05221140	220Ω
R679	1	1	GD05471140	470Ω
R680	1	1	GD05471140	470Ω
R681	1	1	GD05471140	470Ω
R682	1	1	GD05471140	470Ω
				PK22-SEMICONDUCTORS
Q651	1	1	HC10001320	IC IR2418B
Q652	1	1	HI11201320	L.E.D. GL112M4
Q671	1	1	HC10001320	IC IR2418B
Q672	1	1	HI11201320	L.E.D. GL112M4
Q711	1	1	HI10011050	L.E.D. TLR226
Q712	1	1	HI10011050	L.E.D. TLR226
Q713	1	1	HI10011050	L.E.D. TLR226
Q715	1	1	HQ10201020	Display Unit LN524RK
Q716	1	1	HQ10201020	Display Unit LN524RK
				PK23-PROGRAM SELECTOR CIRCUIT BOARD
PK23	1	1	YK42792730	P.W. Board, Program Selector
	1	1	ZZ42792730	P.W. Board Assembly
				PK23-SEMICONDUCTORS
Q751	1	1	HD20011050	Diode 1S1555
Q752	1	1	HD20011050	Diode 1S1555
Q753	1	1	HD20011050	Diode 1S1555
Q754	1	1	HD20011050	Diode 1S1555
Q755	1	1	HD20011050	Diode 1S1555
Q756	1	1	HD20011050	Diode 1S1555
Q757	1	1	HD20011050	Diode 1S1555
Q758	1	1	HD20011050	Diode 1S1555
Q759	1	1	HD20011050	Diode 1S1555
Q760	1	1	HD20011050	Diode 1S1555
Q761	1	1	HD20011050	Diode 1S1555
				PK23-SWITCHES
S504	1	1	SR02050140	Rotary Switch, Memory Count
S505	1	1	SR02050140	Rotary Switch, Selector
S506	1	1	SR02030070	Rotary Switch, Program
				PK24-TIMER SWITCH CIRCUIT BOARD
PK24	1	1	YK42792740	P.W. Board, Timer Switch
	1	1	ZZ42792740	P.W. Board Assembly
				PK24-SEMICONDUCTORS
Q714	1	1	HI10009300	L.E.D. AR2132D
Q771	1	1	HD20011050	Diode 1S1555
				PK24-SWITCH
S503	1	1	SC02030110	Switch, Timer

• (U): for U.S.A.
• (C): for Canada

REF. DESIG.	Q'TY U	Q'TY C	PART NO.	DESCRIPTION
				PK25-REC-MUTE SWITCH CIRCUIT BOARD
PK25	1	1	YK42792750	P.W. Board, Rec-Mute Switch
	1	1	ZZ42792750	P.W. Board Assembly
S502	1	1	SP02010430	Push Switch, Rec-Mute
				PK26-REMOTE JACK CIRCUIT BOARD
PK26	1	1	YK42792760	P.W. Board, Remote Jack
	1	1	ZZ42792760	P.W. Board Assembly
R771	1	1	GD05104140	Resistor 100KΩ ±5% ¼W
Q772	1	1	HT107331P0	Transistor 2SA733
J591	1	1	YJ90000220	Jack, Remote (9P)
				PK27-PROGRAM SELECT CIRCUIT BOARD
PK27	1	1	YF42792770	P.W. Board, Program Select
	1	1	ZZ42792770	P.W. Board Assembly
				PK27-CAPACITORS
C701	1	1	DF15223350	Film 0.022μF ±5%
C702	1	1	EA10505030	Elect 1μF 50V
C703	1	1	EQ10505010	Elect 1μF 50V
				PK27-RESISTORS (All Resistors are ±5% and ¼W)
R716	1	1	GD05223140	22KΩ
R717	1	1	GD05473140	47KΩ
R718	1	1	GD05472140	4.7KΩ
R719	1	1	GD05104140	100KΩ
R720	1	1	GD05223140	22KΩ
R721	1	1	GD05473140	47KΩ
R722	1	1	GD05472140	4.7KΩ
R723	1	1	GD05104140	100KΩ
R724	1	1	GD05104140	100KΩ
R725	1	1	GD05104140	100KΩ
R726	1	1	GD05104140	100KΩ
R727	1	1	GD05103140	10KΩ
R728	1	1	GD05104140	100KΩ
				PK27-SEMICONDUCTORS
Q704	1	1	HC402300U0	IC, μPD4023C or MC14023
Q705	1	1	HC452800B0	IC, μPD4528C or MC14528B
Q706	1	1	HC401100U0	IC, μPD4011C or MC14011
Q707	1	1	HC401100U0	IC, μPD4011C or MC14011
Q711	1	1	HT326341S0	Transistor 2SC2634(S)
Q712	1	1	HT326341S0	Transistor 2SC2634(S)
Q713	1	1	HT326341S0	Transistor 2SC2634(S)
Q714	1	1	HT320601R0	Transistor 2SC2060(R)
Q762	1	1	HD20011050	Diode 1S1555
Q763	1	1	HD20011050	Diode 1S1555
Q764	1	1	HD20011050	Diode 1S1555
Q765	1	1	HD20011050	Diode 1S1555
Q766	1	1	HD20011050	Diode 1S1555
Q767	1	1	HD20011050	Diode 1S1555
Q768	1	1	HD20011050	Diode 1S1555
Q769	1	1	HD20011050	Diode 1S1555
Q770	1	1	HD20011050	Diode 1S1555

REF. DESIG.	Q'TY U	Q'TY C	PART NO.	DESCRIPTION
Q771	1	1	HD20011050	Diode 1S1555
Q772	1	1	HD20011050	Diode 1S1555
Q773	1	1	HD20011050	Diode 1S1555
Q774	1	1	HD20011050	Diode 1S1555
Q775	1	1	HT326341S0	Transistor 2SC2634(S)
				PK31-LOGIC CONTROL CIRCUIT BOARD
PK31	1	1	YH42791310	P.W. Board, Logic Control
	1	1	ZZ42791310	P.W. Board Assembly
				PK31-L.E.D.
Q591	1	1	HI10015020	L.E.D. LN317GP
Q592	1	1	HI10016020	L.E.D. LN417YP
Q593	1	1	HI10014020	L.E.D. LN217RP
				PK31-SWITCHES
S591	1	1	SK02010020	Keyboard Switch, REW
S592	1	1	SK02010020	Keyboard Switch, Stop
S593	1	1	SK02010020	Keyboard Switch, FF
S594	1	1	SK02010020	Keyboard Switch, Play
S595	1	1	SK02010020	Keyboard Switch, Pause
S596	1	1	SK02010020	Keyboard Switch, Rec
P591	1	1	YB00450080	Connective Cord (10P)
				PK32-SAFETY SWITCH CIRCUIT BOARD
PK32	1	1	YH42791320	P.W. Board, Safety Switch
	1	1	ZZ42791320	P.W. Board Assembly
S597	1	1	SP01010350	Push Switch, Safety
				PK33-SAFETY SWITCH CIRCUIT BOARD
PK33	1	1	YH42791330	P.W. Board, Safety Switch
	1	1	ZZ42791330	P.W. Board Assembly
S598	1	1	SP01010350	Push Switch, Safety
				PM01-MOTOR GOVERNOR CIRCUIT BOARD
PM01	1	1	YF43970020	P.W. Board, Motor Governor
	1	1	ZZ42971020	P.W. Board Assembly
				PM01-CAPACITORS
C011	1	1	EQ22601610	Elect 22μF 16V
CM01	1	1	DF15333300	Film 0.033μF ±5%
CM02	1	1	EA10602530	Elect 10μF 25V
CM03	1	1	DF15472300	Film 0.0047μF ±5%
CM04	1	1	EA10405030	Elect 0.1μF 50V
CM05	1	1	EA10405030	Elect 0.1μF 50V
CM06	1	1	EA10602530	Elect 10μF 25V
CM07	1	1	EA10602530	Elect 10μF 25V
CM08	1	1	EA10505030	Elect 1μF 50V
CM09	1	1	EA10405030	Elect 0.1μF 50V
CM10	1	1	EA10405030	Elect 0.1μF 50V
CM11	1	1	EA10602530	Elect 10μF 25V
CM12	1	1	EA10602530	Elect 10μF 25V
CM13	1	1	EA22701630	Elect 220μF 16V
CM14	1	1	EA47601630	Elect 47μF 16V
CM15	1	1	EA33601630	Elect 33μF 16V
CM16	1	1	EA47405030	Elect 0.47μF 50V
CM17	1	1	EA10602530	Elect 10μF 25V
CM18	1	1	EA47601630	Elect 47μF 16V
CM19	1	1	EA22601630	Elect 22μF 16V
CM20	1	1	EA47602530	Elect 47μF 25V
CM22	1	1	EA10405030	Elect 0.1μF 50V
CM23	1	1	EA47601630	Elect 47μF 16V

• (U): for U.S.A.
• (C): for Canada

REF. DESIG.	Q'TY U	Q'TY C	PART NO.	DESCRIPTION
				PM01-RESISTORS
				(All Resistors are ±5% and ¼W)
RM01	1	1	GG05331140	330Ω
RM02	1	1	GD05153140	15KΩ
RM03	1	1	GD05103140	10KΩ
RM04	1	1	GD05103140	10KΩ
RM05	1	1	GD05222140	2.2KΩ
RM06	1	1	GD05222140	2.2KΩ
RM07	1	1	GD05222140	2.2KΩ
RM08	1	1	GD05222140	2.2KΩ
RM09	1	1	GD05103140	10KΩ
RM10	1	1	GD05103140	10KΩ
RM11	1	1	RA01020300	1KΩTrim. Auto Tension
RM12	1	1	GG05181140	180Ω
RM13	1	1	GD05152140	1.5KΩ
RM14	1	1	GD05152140	1.5KΩ
RM15	1	1	GD05223140	22KΩ
RM16	1	1	GD05223140	22KΩ
RM17	1	1	GD05223140	22KΩ
RM18	1	1	GD05223140	22KΩ
RM19	1	1	GD05104140	100KΩ
RM20	1	1	GD05104140	100KΩ
RM21	1	1	GD05472140	4.7KΩ
RM22	1	1	GD05472140	4.7KΩ
RM23	1	1	GD05333140	33KΩ
RM24	1	1	GD05333140	33KΩ
RM25	1	1	GD05333140	33KΩ
RM26	1	1	GD05103140	10KΩ
RM27	1	1	GD05103140	10KΩ
RM32	1	1	GD05394140	390KΩ
RM34	1	1	RA05030160	50KΩTrim. CUE/REV
RM35	1	1	GG05471140	470Ω
RM36	1	1	GD05562140	5.6KΩ
RM37	1	1	GD05152140	1.5KΩ
RM38	1	1	GD05153140	15KΩ
RM39	1	1	GD05204140	200KΩ
RM40	1	1	GD05333140	33KΩ
RM41	1	1	GD05104140	100KΩ
RM43	1	1	GD05103140	10KΩ
RM44	1	1	GD05104140	100KΩ
RM45	1	1	GD05222140	2.2KΩ
RM46	1	1	GD05473140	47KΩ
RM47	1	1	GD05153140	15KΩ
RM48	1	1	RA05030160	50KΩTrim. Center Speed
RM49	1	1	GD05473140	47KΩ
RM50	1	1	GD05222140	2.2KΩ
				PM01-SEMICONDUCTORS
QM01	1	1	HC10004250	IC CX-065A
QM02	1	1	HT106841R0	Transistor 2SA684(R)
QM03	1	1	HT106841R0	Transistor 2SA684(R)
QM04	1	1	HT313841R0	Transistor 2SC1384(R)
QM05	1	1	HT313841R0	Transistor 2SC1384(R)
QM06	1	1	HT309451R0	Transistor 2SC945(R)
QM07	1	1	HT309451R0	Transistor 2SC945(R)
QM08	1	1	HT403131E0	Transistor 2SD313(E)
QM09	1	1	HT309451R0	Transistor 2SC945(R)
QM10	1	1	HT403131E0	Transistor 2SD313(E)

REF. DESIG.	Q'TY U	Q'TY C	PART NO.	DESCRIPTION
QM11	1	1	HT309451R0	Transistor 2SC945(R)
QM12	1	1	HT309451R0	Transistor 2SC945(R)
QM13	1	1	HT309451R0	Transistor 2SC945(R)
QM14	1	1	HT309451R0	Transistor 2SC945(R)
QM15	1	1	HD20011050	Diode 1S1555
QM16	1	1	HD20011050	Diode 1S1555
QM18	1	1	HD20011050	Diode 1S1555
QM19	1	1	HT309451R0	Transistor 2SC945(R)
QM20	1	1	HF200301C0	F.E.T. 2SK30A(Y)
QM21	1	1	HC452800B0	IC, μPD4528C or MC14528B
QM22	1	1	HD10001010	Diode 1N34A
QM23	1	1	HD10001010	Diode 1N34A
				P400-POWER SUPPLY & BIAS OSC CIRCUIT BOARD
P400	1	1	YF42790040	P.W. Board, Power Supply & Bias OSC
	1	1	ZZ42800040	P.W. Board Assembly
				P400-CAPACITORS
C401	1	1	DK18102300	Ceramic 1000pF
C402	1	1	DK18102300	Ceramic 1000pF
C403	1	1	DK18102300	Ceramic 1000pF
C404	1	1	DK18102300	Ceramic 1000pF
⚠C405	1	1	EA10803530	Elect 1000μF 35V
⚠C406	1	1	EA10803530	Elect 1000μF 35V
⚠C407	1	1	EA47703530	Elect 470pF 35V
⚠C408	1	1	EA47702530	Elect 470pF 25V
C409	1	1	DK18102300	Ceramic 1000pF
C410	1	1	DK18102300	Ceramic 1000pF
C411	1	1	DK18102300	Ceramic 1000pF
C412	1	1	DK18102300	Ceramic 1000pF
⚠C413	1	1	EA22803530	Elect 2200μF 35V
⚠C414	1	1	EA22803530	Elect 2200μF 35V
C415	1	1	DF75103510	Film 0.01μF ±5%
C416	1	1	DF75103510	Film 0.01μF ±5%
C417	1	1	DF75332510	Film 3300pF ±5%
C418	1	1	DF75332510	Film 3300pF ±5%
C419	1	1	DF75682510	Film 6800pF ±5%
C420	1	1	EE22505040	Elect 2.2μF 50V
C421	1	1	DF75102510	Film 1000pF ±5%
C422	1	1	DF55391510	Film 390pF ±5%
C423	1	1	DF55391510	Film 390pF ±5%
⚠C424	1	1	EA22802530	Elect 2200μF 25V
C425	1	1	DK18473320	Ceramic 0.047μF
⚠C426	1	1	EA47701630	Elect 470μF 16V
C429	1	1	DF75153510	Film 0.015μF ±5%
C430	1	1	DF75153510	Film 0.015μF ±5%
C431	1	1	DF75183510	Film 0.018μF ±5%
C432	1	1	EE22505040	Elect 2.2μF 50V
C433	1	1	DF75183510	Film 0.018μF ±5%
C434	1	1	EA47702530	Elect 470μF 25V
⚠C435	1	1	EA10801630	Elect 1000μF 16V
C436	1	1	DK18473320	Ceramic 0.047μF
C439	1	1	EA22703530	Elect 220μF 35V
C440	1	1	EA10701630	Elect 100μF 16V
C441	1	1	DF55101510	Film 100pF ±5%
C442	1	1	DF55101510	Film 100pF ±5%
⚠C445	1	1	EA10801630	Elect 1000μF 16V
C448	1	1	EA10505030	Elect 1μF 50V

• (U): for U.S.A.
• (C): for Canada

REF. DESIG.	Q'TY U	Q'TY C	PART NO.	DESCRIPTION
				P400-RESISTORS
				(All Resistors are ±5% and ¼W)
⚠ R401	1	1	GA05056010	5.6Ω 1W
⚠ R402	1	1	GA05471010	470Ω 1W
⚠ R403	1	1	GA05391010	390Ω 1W
R404	1	1	GD05223140	22KΩ
R405	1	1	GD05223140	22KΩ
R406	1	1	GD05100140	10Ω
R407	1	1	GD05100140	10Ω
R408	1	1	GJ05472010	4.7KΩ 1W
R409	1	1	GJ05472010	4.7KΩ 1W
R410	1	1	RA02230080	22KΩ Trim. Bias Current
R411	1	1	RA02230080	22KΩ Trim. Bias Current
R415	1	1	GD05273140	27KΩ
R416	1	1	GD05056140	5.6Ω
⚠ R418	1	1	GG05102120	1KΩ ½W
⚠ R419	1	1	GA05056020	5.6Ω 2W
⚠ R420	1	1	GA05821010	820Ω 1W
R421	1	1	GD05272140	2.7KΩ
R422	1	1	GD05432140	4.3KΩ
R423	1	1	GD05123140	12KΩ
R424	1	1	GD05472140	4.7KΩ
R425	1	1	GD05332140	3.3KΩ
R426	1	1	GD05563140	56KΩ
R427	1	1	GD05101140	100Ω
⚠ R428	1	1	GA05102010	1KΩ 1W
⚠ R429	1	1	GA05102010	1KΩ 1W
R430	1	1	GD05332140	3.3KΩ
R431	1	1	GD05010140	1Ω
R432	1	1	GD05010140	1Ω
⚠ R435	1	1	GA05222010	2.2Ω 1W
⚠ R440	1	1	GG05220140	22Ω
				P400-SEMICONDUCTORS
⚠ Q401	1	1	HD20020080	Diode MI-151R
⚠ Q402	1	1	HD20019080	Diode MI-151
⚠ Q403	1	1	HT403131F0	Transistor 2SD313(F)
⚠ Q404	1	1	HD30048090	Zener WZ-210
⚠ Q405	1	1	HD20008290	Diode S4VB
Q409	1	1	HT313841R0	Transistor 2SC1384(R)
Q410	1	1	HT313841R0	Transistor 2SC1384(R)
⚠ Q411	1	1	HD20020080	Diode MI-151R
⚠ Q412	1	1	HD20019080	Diode MI-151
⚠ Q413	1	1	HD20020080	Diode MI-151R
⚠ Q414	1	1	HD20019080	Diode MI-151
Q417	1	1	HT313841R0	Transistor 2SC1384(R)
⚠ Q419	1	1	HD20020080	Diode MI-151R
⚠ Q420	1	1	HD20019080	Diode MI-151
⚠ Q421	1	1	HT403131F0	Transistor 2SD313(F)
Q422	1	1	HT309451P0	Transistor 2SC945(P)
⚠ Q423	1	1	HD30015060	Zener RD5.6EB2
Q424	1	1	HT309451P0	Transistor 2SC945(P)
⚠ Q425	1	1	HD20022100	Diode 10E-1
Q426	1	1	HD30024090	Zener WZ-120
Q427	1	1	HT309451P0	Transistor 2SC945(P)
Q428	1	1	HD20011050	Diode 1S1555
Q429	1	1	HD20011050	Diode 1S1555
Q431	1	1	HD20022100	Diode 10E-1
⚠ Q432	1	1	HT403131E0	Transistor 2SD313(E)
Q433	1	1	HD20022100	Diode 10E-1
Q434	1	1	HD20022100	Diode 10E-1

REF. DESIG.	Q'TY U	Q'TY C	PART NO.	DESCRIPTION
				P400-MISCELLANEOUS
L401	1	1	LC12750020	Choke Coil 2.7mH
L402	1	1	LC12750020	Choke Coil 2.7mH
⚠ L403	1	1	LY40240090	Relay, Rec/Play
L404	1	1	LC22260060	Choke Coil 22mH
L405	1	1	LC22260060	Choke Coil 22mH
T401	1	1	TC10140140	OSC Transf. Bias 105KHz
T402	1	1	TC10140130	OSC Transf. Erase 65KHz
P404	1	1	YJ06001250	Jack, (5P)
P409	1	1	YJ06001250	Jack (5P)
				P500-DOLBY CIRCUIT BOARD
P500	4	4	YK42760810	P.W. Board, Dolby
	4	4	ZZ42800810	P.W. Board Assembly
				P500-CAPACITORS
C501	4	4	DD15620360	Ceramic 62pF ±5%
C504	4	4	EA10602530	Elect 10μF 25V
C505	4	4	EA10405030	Elect 0.1μF 50V
C506	4	4	EA33405030	Elect 0.33μF 50V
C507	4	4	DF15473300	Film 0.047μF ±5%
C508	4	4	DF15472300	Film 4700pF ±5%
C509	4	4	EA10602530	Elect 10μF 25V
C510	4	4	DF15273300	Film 0.027μF ±5%
C511	4	4	DF15562300	Film 5600pF ±5%
C512	4	4	EA22701030	Elect 220μF 10V
C513	4	4	EA10602530	Elect 10μF 25V
C514	4	4	EA10602530	Elect 10μF 25V
C515	4	4	EA10701630	Elect 100μF 16V
				P500-RESISTORS
				(All Resistors are ±5% and ¼W)
R501	4	4	GD05274140	270KΩ
R502	4	4	GD05564140	560KΩ
R503	4	4	GD05274140	270KΩ
R504	4	4	GD05473140	47KΩ
R505	4	4	GD05181140	180Ω
R506	4	4	GD05332140	3.3KΩ
R507	4	4	GD05104140	100KΩ
				P500-SEMICONDUCTORS
Q501	4	4	HC10001360	IC LM1101AN
Q502	4	4	HD20011050	Diode 1S1555
				P500-COIL
L501	4	4	LC23660030	Choke Coil 36mH Bias Trap

• (U): for U.S.A.
• (C): for Canada

REF. DESIG.	Q'TY U	Q'TY C	PART NO.	DESCRIPTION
				P800-TIMER RELAY CIRCUIT BOARD
P800	1	1	YF42790050	P.W. Board, Timer Relay
	1	1	ZZ42790050	P.W. Board Assembly
				P800-RESISTORS
R801	1	1	GD05103140	10KΩ ±5% ¼W
R802	1	1	GD05102140	1KΩ ±5% ¼W
R803	1	1	GD05103140	10KΩ ±5% ¼W
R804	1	1	GD05103140	10KΩ ±5% ¼W
				P800-SEMICONDUCTORS
Q801	1	1	HD20022100	Diode 10E-1
Q802	1	1	HT106841R0	Transistor 2SA684(R)
Q803	1	1	HT309451Q0	Transistor 2SC945(Q)
Q804	1	1	HT309451Q0	Transistor 2SC945(Q)
				P800-MISCELLANEOUS
J803 ~ J810	8	8	YP10001530	Plug
J814	1	1	YP10001130	Plug, Wire Wrap
J851	3	3	YP10001130	Plug, Wire Wrap
⚠ L802	1	1	LY10120140	Relay, G2W-1112V UL, CSA
Z801	1		BF10400030	Cap. Comp. Spark Killer
G001		1	BF33300020	Cap. Comp. Spark Killer
				P900-MUSIC INTERVAL DETECTOR CIRCUIT BOARD
P900	1	1	YF42800010	P.W. Board, Music Interval Detector
				P900-CAPACITORS
C901	1	1	DD15101300	Ceramic 100pF ±5%
C902	1	1	DD15101300	Ceramic 100pF ±5%
C903	1	1	EE10601640	Elect 10μF 16V
C904	1	1	EE10601640	Elect 10μF 16V
C905	1	1	EA10602530	Elect 10μF 25V
C906	1	1	EA10602530	Elect 10μF 25V
C907	1	1	DD15470300	Ceramic 47pF ±5%
C908	1	1	DD15470300	Ceramic 47pF ±5%
C909	1	1	DD15330300	Ceramic 33pF ±5%
C910	1	1	DD15330300	Ceramic 33pF ±5%
C911	1	1	EA10602530	Elect 10μF 25V
C912	1	1	EA10602530	Elect 10μF 25V
C913	1	1	DF15103300	Film 0.01μF ±5%
C914	1	1	DF15103300	Film 0.01μF ±5%
C915	1	1	EA47405030	Elect 0.47μF 50V
C916	1	1	EA47405030	Elect 0.47μF 50V
C917	1	1	DK18103300	Ceramic 0.01μF
C918	1	1	DK18103300	Ceramic 0.01μF
C919	1	1	EA10702530	Elect 100μF 25V
				P900-RESISTORS (All Resistors are ±5% and ¼W)
R901	1	1	RN05224140	220KΩ
R902	1	1	RN05224140	220KΩ
R903	1	1	GD05221140	220Ω
R904	1	1	GD05221140	220Ω
R905	1	1	GD05823140	82KΩ
R906	1	1	GD05823140	82KΩ
R907	1	1	GD05104140	100KΩ
R908	1	1	GD05104140	100KΩ
R909	1	1	GD05103140	10KΩ
R910	1	1	GD05103140	10KΩ

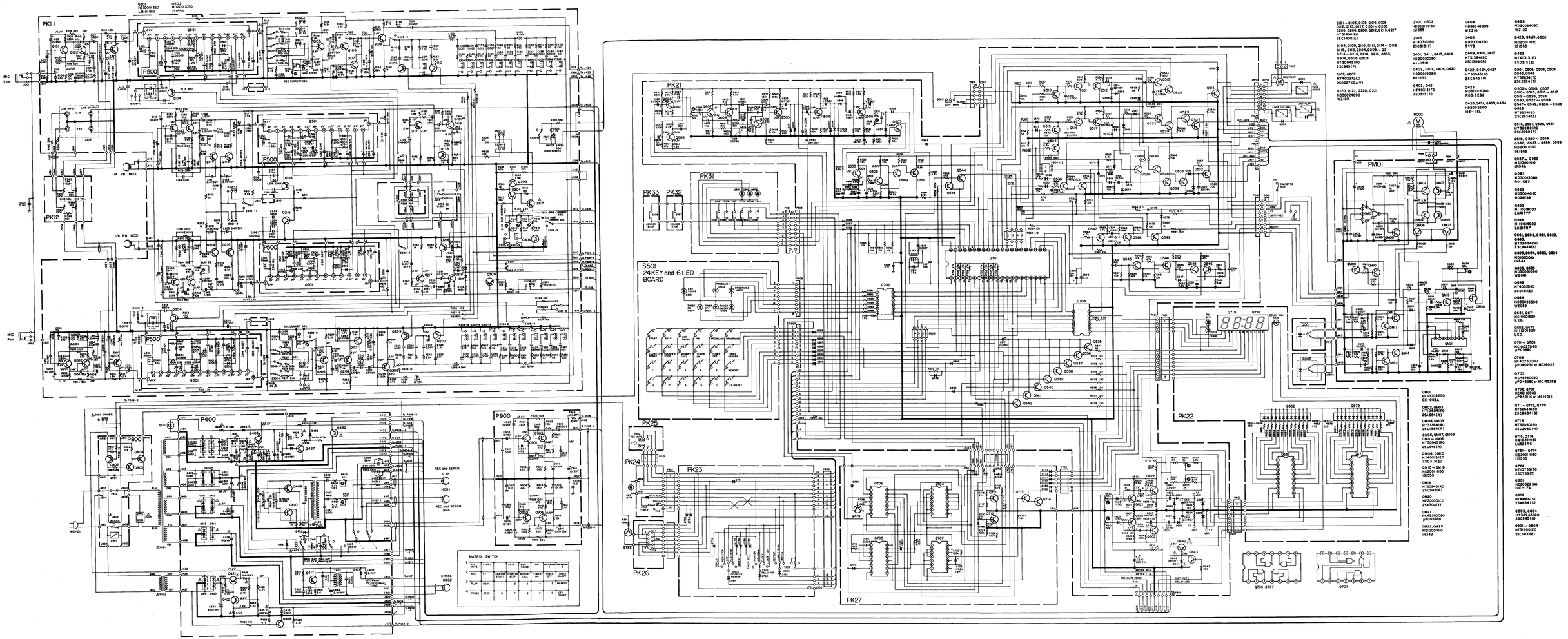
REF. DESIG.	Q'TY U	Q'TY C	PART NO.	DESCRIPTION
R911	1	1	GD05271140	270Ω
R912	1	1	GD05271140	270Ω
R913	1	1	GD05561140	560Ω
R914	1	1	GD05561140	560Ω
R915	1	1	GD05153140	15KΩ
R916	1	1	GD05153140	15KΩ
R917	1	1	GD05184140	180KΩ
R918	1	1	GD05184140	180KΩ
R919	1	1	GG05152140	1.5KΩ
				P900-TRANSISTORS
Q901	1	1	HT314001E0	Transistor 2SC1400(E)
Q902	1	1	HT314001E0	Transistor 2SC1400(E)
Q903	1	1	HT314001E0	Transistor 2SC1400(E)
Q904	1	1	HT314001E0	Transistor 2SC1400(E)
				P001-PHOTO COUPLER CIRCUIT BOARD
P001	2	2	YF43970010	P.W. Board, Photo Coupler
	2	2	ZZ43970010	P.W. Board Assembly
Q001	2	2	HW10001030	Photo Unit

(W01-99)	**Assembly and Wiring**
(T01-99)	**Adjustment**
(X01-00)	**Correction**

11. TECHNICAL SPECIFICATIONS

Type	Front loading 4-Track, 2-Channel Stereo Record/Playback System	
Tape	Phillips-type Compact Cassette	
Tape Speeds	High: 3-3/4 ips (9.52 cm/sec)	Standard: 1-7/8 ips (4.76 cm/sec)
Motor Drive System	DC Servo Motor (x2) with Single Capstan Drive	
Heads	3 Head System	
	Erase Head: Ferrite	
	Record/Play Head: Sendust Alloy	
Level Indicators	Left and Right LED Peak Level Displays	
Noise Reduction System	Double Dolby NR	
Semiconductors		
Transistors	97	
IC's	9	
Diodes	76	
LED's	18	
Wow and Fluter (WRMS)	High Speed	Standard Speed
	0.03%	0.05%
Frequency Response (Overall, –20 dB below 0 VU)		
Metal	25 Hz ~ 23 kHz (±3 dB)	25 Hz ~ 20 kHz (±3 dB)
Ferrichrome (FeCr)	25 Hz ~ 22 kHz (±3 dB)	25 Hz ~ 18 kHz (±3 dB)
Chromium Dioxide (CrO_2)	25 Hz ~ 22 kHz (±3 dB)	25 Hz ~ 17 kHz (±3 dB)
Ferric (Normal)	25 Hz ~ 20 kHz (±3 dB)	25 Hz ~ 16 kHz (±3 dB)
Signal-to-Noise Ratio		
Dolby ON	72 dB (over 5 kHz)	69 dB (over 5 kHz)
Dolby OFF	62 dB	59 dB
Outputs		
Line: Level	650 mV	
Impedance	1.2 kΩ	
Headphone: Level	43 mV	
Impedance	150 Ω	
Inputs (Level at 0 VU)		
Line: Sensitivity	–23 dBV (70 mV)	
Impedance	82 kΩ	
Mic: Sensitivity	–72 dBV (0.25 mV)	
Impedance	Low Z	
Fast Rewind Time	Approx. 85 sec. (C-60 cassette)	
Fast Forward Time	Approx. 85 sec. (C-60 cassette)	
Bias Frequency	100 kHz	
Power Requirements	120 V AC, 60 Hz	
Power Consumption	30 Watts	
Dimensions (W x H x D)	16-3/8 in. x 5-3/4 in. x 11-5/8 in.	
	(41.6 cm) x (14.6 cm) x (29.5 cm)	
Net Weight	22 lbs. 1 oz. (10 kg)	

NOTES:
1. Reference recording level: 0 VU (160 nW/M)
2. Reference frequency: 315 Hz
3. Wow and flutter measured at: 3.0 kHz NAB WGTD RMS
4. Frequency response measured at: 20 dB below 0 VU recording level reference (Dolby off)
5. S/N ratio measured at the recorded level equivalent to 3% THD, IEC "A" WGTD, 70 μSec. EQ.
6. Recording reference tapes:
   Normal: TDK AC 211
   CrO_2 : TDK AC 511
   FeCr: Sony CS 30
   Metal: TDK AC-701



SWITCHES

S301:	TAPE SELECTOR	(NORMAL)	S304:	TAPE SELECTOR	(Metal)
S302:	TAPE SELECTOR	(Special/CrO)	S305:	TAPE SPEED SWITCH	(STANDARD)
S303:	TAPE SELECTOR	(FeCr)			

Note on safety: The parts marked with ⚠ are important parts on the safety. Please use the parts having the designated parts number without fail.

Components and wiring are subject to change for modification without notice.